FLIGHT and AIRCRAFT ENGINEER

Editorial Director G. GEOFFREY SMITH, M.B.E.
Editor - - C. M. POULSEN
Assistant Editor - MAURICE A. SMITH, D.F.C. (WING CDR., R.A.F.V.R.)
Art Editor - - JOHN YOXALL

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams : Flightpres, Sedist, London. Telephone : Waterloo 3333 (60 lines.)

COVENTRY : 8 - 10, CORPORATION ST. Telegrams : Autocar, Coventry. Telephone : Coventry 5210.
BIRMINGHAM, 2 : KING EDWARD HOUSE, NEW STREET. Telegrams : Autopress, Birmingham. Telephone : Midland 7191 (7 lines).
MANCHESTER, 3 : 260, DEANSGATE. Telegrams : Iliffe, Manchester. Telephone : Blackfriars 4412.
GLASGOW, C.2 : 26B, RENFIELD ST. Telegrams : Iliffe, Glasgow. Telephone : Central 4857

SUBSCRIPTION RATES : Home and Abroad : Year, £3 1 0. 6 months, £1 10 6.

No. 2062 Vol. LIV July 1st, 1948 Thursdays, One Shilling

The Outlook

Fly British

IF one is short of basic facts and dazzled by the sparks of information flying from private axes in process of being ground to razor sharpness, it is hard to form a reliable opinion on any subject. Moreover, when a purely aeronautical problem becomes also a political one, the mere technical observer finds himself even more at sea. However, the question of what aircraft to buy for our Empire routes is one which demands attention and comment. Considerations which must weigh most heavily in the balance are, first and foremost, British prestige and, secondly, dollar cost. To enlarge on these two involves one in very controversial deliberations.

Examined from the point of view of the individual parties concerned, it is obvious that the Corporations wish to show the smallest possible deficit and the largest dollar earnings, and, neglecting all other considerations, Constellations would almost certainly be their choice for the long-range Atlantic, Australian and Far Eastern routes. There is an immediate outlay in American dollars, and the less easily estimated possible long-term cost in prestige and loss of experience to our home industry.

It may be assumed, too, that those whose responsibility it is to decide cannot altogether ignore Marshall obligations. With the Dominions we have the closest possible ties, and, moreover, it needs no great knowledge of strategy to realize that a dispersal of our aircraft-production capacity throughout Canada and Australia, for example, is desirable and to be encouraged. In addition, the Canadair Four, the aircraft which here enters the picture, has British Rolls-Royce engines, and is capable of earning dollars in competition with Constellations. Payment, moreover, might be the subject of long-term Commonwealth agreements.

There is, finally, the nationalist point of view—one to which we attach the greatest importance. If we are prepared to give high priority to the conversion, completion and development of Tudor IVs, there is no reason why these very satisfactory British aircraft should not serve us admirably and with the minimum of delay.

The British taxpayer is getting tired of making good the vast losses of the nationalized industries and concerns, but he would still be happy to accept the reduced operating income expected from the Tudor IV in preference to yet more dollar expenditure, and the severe blow to British prestige and our aircraft industry which would result from a further large order for American aircraft. The Tudor IV is capable of earning almost as many dollars as the Constellation or Canadair Four, although it may show a larger sterling deficit on the balance sheets.

Undoubtedly the old stop-gap types have reached the end of their useful lives and, in fact, are losing dollar traffic and bringing discredit to their operators. For that reason a change is now urgent. Whichever British aircraft can be operated safely and creditably should be delivered and operated. If there are a few which, by reason of range, take-off and the airfields available, are unsuitable for operation, they must be eliminated.

A major order for aircraft placed abroad now would have most serious repercussions at home. British craftsmen would have their livelihood endangered, productive capacity in the industry would inevitably fall off, experience of inestimable value would be lost, the industry's long-term plans would be jeopardized, our export drive would be hampered and even such apparent details as apprentice schemes within the industry would suffer.

It is our earnest hope that at the earliest opportunity Tudor IVs will be in operation on the longer services, and Hermes on the medium-range Empire routes.

Turbine Progress

A WEEK or two ago Sir Miles Thomas gave his opinion that there was some support for the American beliefs that their jet engine development was gaining on our own. Provided that the word development is used in its most straightforward sense, it is to be expected that a country with up to five times the manpower and facilities on the job will catch up on

the development of existing designs. What is more, there is still a free interchange of new information between the countries which, in the case of gas turbines, is something of a one-way flow. It is to be hoped that there is a compensatory return flow on the subject of flight at and above sonic speed. So far as advancement is concerned, this country, thanks to its greater experience and brilliant leadership in engine design, is probably keeping a few steps ahead.

Without professing to know what the Americans may have up their sleeves—and their enterprise and ability are unquestionable—it can be regarded as significant that the importance in America of the Rolls-Royce Nenes (at present rated at 5,000lb thrust but probably capable of more), to be built under licence by Pratt and Whitney, is increasing as the full excellence of these units is proved and appreciated. Moreover, no American turbojet now flying delivers normal power in excess of 4,000lb thrust, a figure well below modern requirements. The overhaul periods of British units also compares favourably.

Regarding airscrew-driving turbines, this country has made a good start but there is still a long way to go and no other country has done more than cross the starting line. Even though some well-known gas turbine engineers doubt whether turboprops have either a military or civil future, it is comforting to know that we have at least four different types flying and four others running.

Difficulties were foreseen with airscrew-driving turbines, and fears were expressed very early that the simplicity—one of the most attractive features of the pure jets—would inevitably be lost. Icing problems, which moved up to number one priority following the solution of early reduction gear troubles, have temporarily taken second place to those concerned with inter-control of power output and airscrew pitch. New devices such as an automatic jet pipe temperature control and new terms such as discing have come into being.

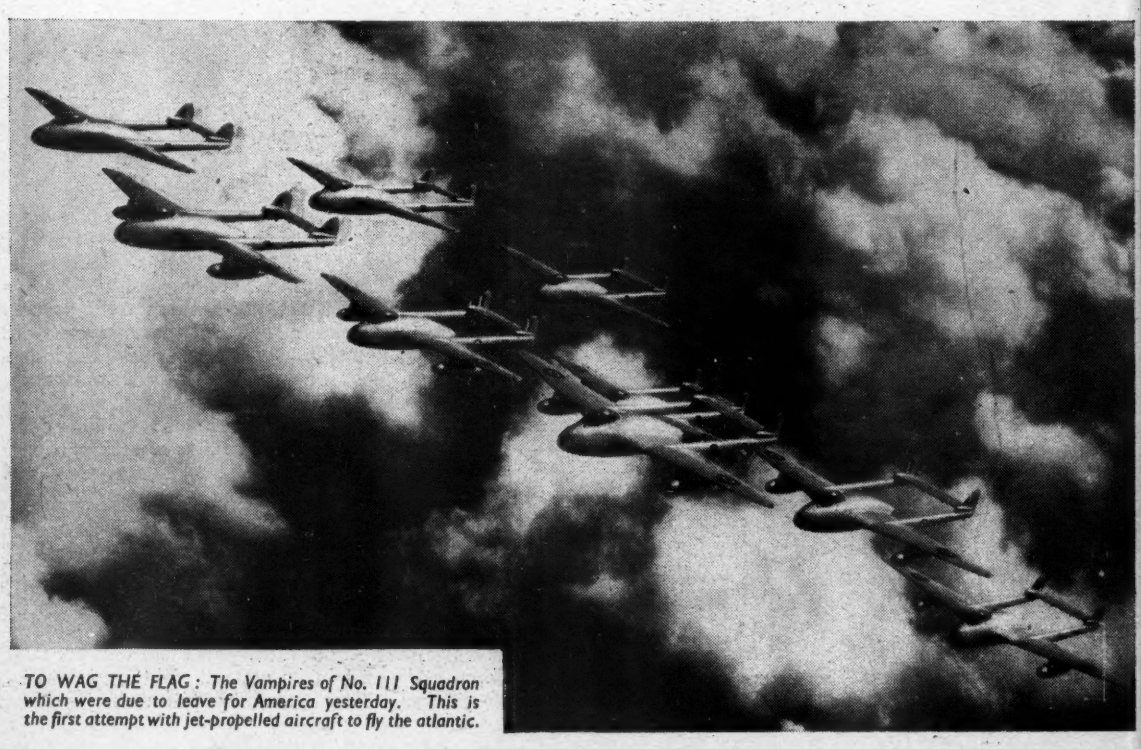
The success of turboprops, which must always be at a disadvantage on the score of weight, cost and complication when compared with pure jets, will depend chiefly upon their economy of operation. However, the operational future of the turboprop may finally be settled by the limitations of its rival. The tremendous difficulties surrounding the building of either a large military or civil aircraft with a practical range, and capable of flying at the speed and height necessary to exploit turbojet performance, may weigh the scales in favour of the otherwise less desirable airscrew-driving turbines as power units for this class of aircraft.

A decision is of immediate and vital importance, and must have the most significant influence on the selection of air transports for use during the next ten or fifteen years. The bold step already taken by one company, in preparing to build a most advanced pure-jet transport must be an encouragement towards similar enterprise from others. Let us hurry slowly like the tortoise, but remember, too, that he makes no progress at all unless he sticks his neck out.

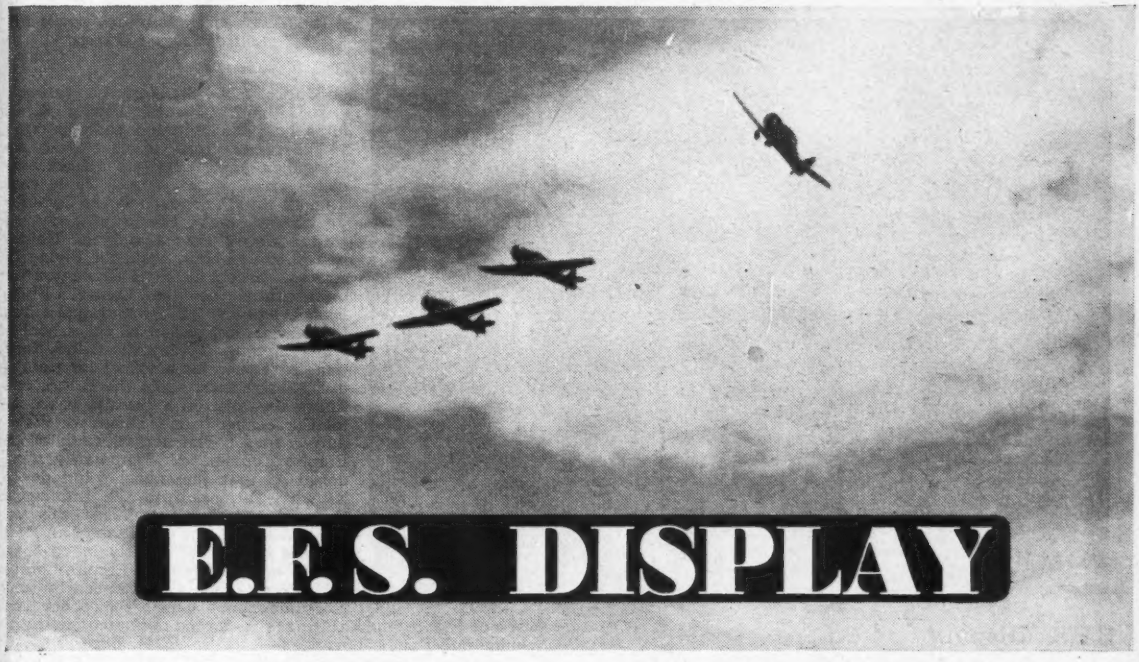
CONTENTS

Outlook	1
E.F.S. Display	3
Here and There	6
Derby Air Display	7
"600" In Camp	8
Civil Aviation News	10
Balliol	13
Gloster E1/44	19
Research Revelation	20
Sporting Assembly	22
I.C.A.O. Second Assembly	24
Service Aviation	26
Correspondence	28

Forthcoming Events, page 28



TO WAG THE FLAG: The Vampires of No. 111 Squadron which were due to leave for America yesterday. This is the first attempt with jet-propelled aircraft to fly the atlantic.



E.F.S. DISPLAY

The four Harvard pilots lowered undercarriages at the moment of peeling off after their impeccable exhibition of formation flying.

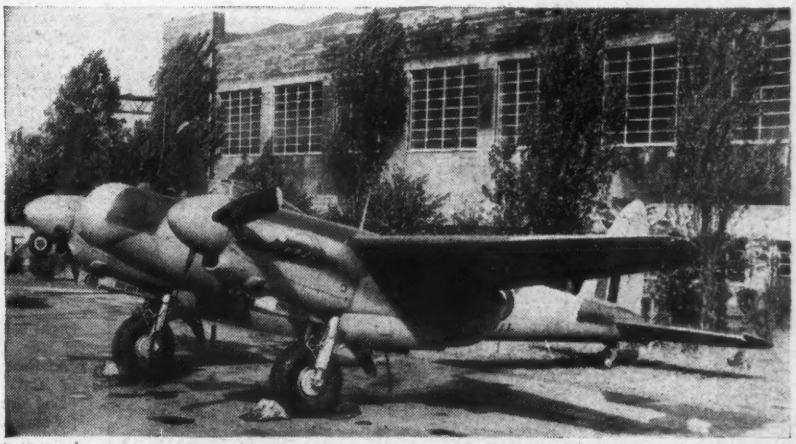
Spectacular and Instructive Display at Hullavington

Illustrated by "Flight" Photographs.

TO mark the passing out of No. 19 Course at the Empire Flying School, Hullavington, a small, but unusually fine, display was put on during the sombre, wet afternoon of June 22nd. Such was the weather, and so difficult is the E.F.S. to locate, that the opening events—formation flying on asymmetric power by three Buckmasters, aerobatics by a Spitfire 9, and synchronized aerobatics by two Harvards—had concluded before our party arrived. The massive Buckmasters, as might have been expected, had convincingly demonstrated the reserve of power afforded by their two 18-cylinder Centaurus engines, while the Spitfire, flown by Major J. S. Wells, S.A.A.F., filled in the gaps very prettily. Flight Lieutenants Guy and Fosket, in the "Siamese" Harvards, received the acclamation of their brother officers; this was praise indeed, for at Hullavington the average piloting skill is probably higher than anywhere in the world.

No heavy, four-engined transport aircraft has ever been more dramatically and convincingly shown off than was the Hastings, in the hands of S/L. R. Fuller, A.F.C., who commands the Handling Squadron. With two airscrews feathered, the squadron leader seemed to persuade more knots out of this amazingly fast new trooper/freighter than could have been predicted by the Handley-Page technical staff. Sweeping across the sodden airfield at zero feet, he repeatedly zoomed the Hastings into the murk above. In a Vampire 3 from C.F.S., F/L. Emmett likewise displayed extraordinary virtuosity; he, too, appeared to have the knack of coaxing a little extra something out of the Vampire. After a fast (but hardly, it seemed, full-speed) fly-past, he did three and a half turns of a roll absolutely vertically. One only regretted that his audience was such a small one.

Four students of the course (Lt. Cdr. C. G. Watson, R.C.N. (leader), F/L. Kelsey, R.A.F., F/L. Guy, R.A.A.F., and F/L. Weighill, R.A.F.) formated closely in Harvards. F/L. Weighill will be known to all Rugger fans, and, like his colleagues, displayed International form in the air. The changes of formation, seen from very close range, were especially interesting. After the howling Harvards, a Meteor 4, piloted by Lt. Davis, R.N., from the Naval Section of the Handling Squadron, made the merest whisper as it passed by at some 600 m.p.h. A Tiger Moth had already taken off with an Olympia glider in tow, and the commentator was not slow to point out that, whereas the Tiger attains a height of 8,000ft in forty minutes, the



A Mosquito NF38—the latest type of R.A.F. night fighter—was on view. Like the Mark 36, which it supersedes, this version has Merlin 113/114 engines.

The Meteor 4, Lt. Davis up, passes by inverted at some 500 knots.

E.F.S. Display . . . . .

Meteor reaches 40,000ft in eight minutes. The Olympia glider has been loaned by Elliotts of Newbury for investigation of the training potentialities of gliders. With F/L. Wilson, of the Training Research Squadron, at the controls, it came winnowing down in a succession of polished aerobatics, making way for the Mercury-powered Boulton Paul P.108. As already announced this is the forerunner of the Mamba-powered Balliol and of a two-seater Merlin-engined version. Mr. Peter Tisshaw did everything in the book (including a spin)—and more. Here, obviously, we have a trainer of quite exceptional manœuvrability. Finally, Mr. John Howman, a Bristol test pilot, brought the Theseus-Lincoln over at low level to show what this flying test bed can do on its two turboprops alone. Transport Command use two similar aircraft for intensive flying on overseas routes.

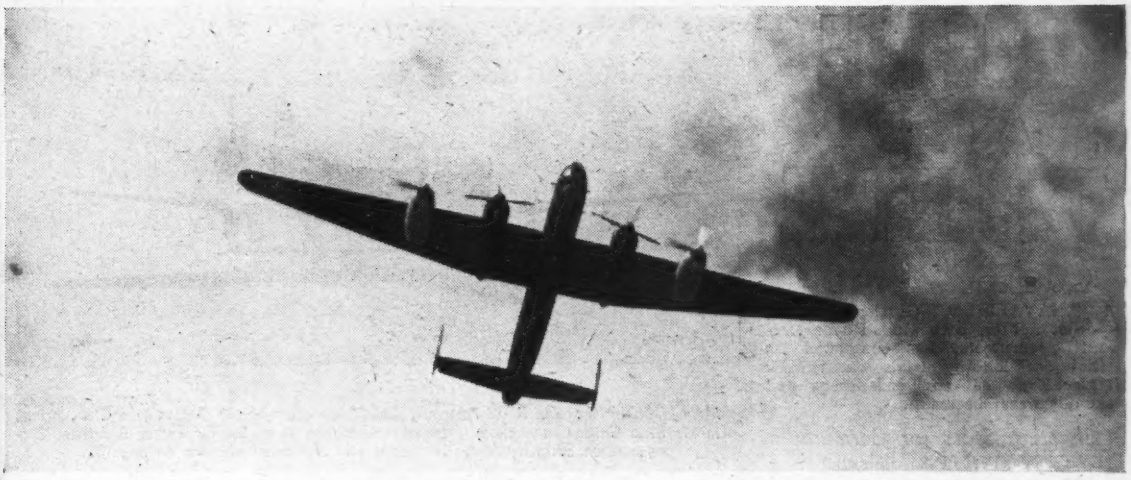
Visitors now had access to a first-rate static display and to examples of the Lancaster, Lancastrian, Valetta, Anson, Buckmaster, Spitfire, Prentice, Meteor, Vampire, Oxford, Mosquito, Harvard, Hastings, Tiger Moth, Auster and Olympia glider—a quite unique collection. The static display was especially valuable in acquainting visitors with the organization and responsibilities of a station of far more than average complexity and interest. Despite the importance of the Empire Flying School, its functions are still not familiar to many people outside the Services; the following history and outline of duties may therefore be valuable.

The Empire Central Flying School formed at Hullavington early in 1942, and between April of that year and December, 1946, over 500 officers completed the Empire Course. These came from all R.A.F. commands, the Commonwealth Air Forces, the Royal Navy, the United States Forces and the Chinese Air Force. In May, 1946, the Flying Instructors School at Little Rissington was reconstituted as the Central Flying School, and the "C" was dropped from the official designation of the school at Hullavington. To-day the C.F.S. functions once more as a school for training flying instructors, while the E.F.S. continues its work on a broader basis. A further change came about at E.F.S. during 1947. The normal work of the Empire Courses was temporarily abandoned so that the school could devote its whole attention to the training of instrument rating examiners; this was the first step in the evolution of an "all-weather air force." Early in 1948 the E.F.S. reconstituted the Empire Courses and this reversion was attended by some reorganization. Thus, the policy and work of E.F.S. and C.F.S. are to-day co-ordinated, the units coming under one commander—A./Cdre. E. D. Barnes, A.F.C. —who is Air Officer Commanding E.F.S. and C.F.S. in addition to being Commandant of the Empire Flying School. The C.F.S. has its own Commandant. Station commander at Hullavington is G/C. G. Bartholomew. The work of E.F.S. is directed by the Chief Instructor, G/C. C. G. Lott, C.B.E., D.S.O., D.F.C., and the school comprises five Wings. O.C. Flying Wing (W/C. T. W. Kean, A.F.C.) is responsible for the organization of all flying and for flying discipline. He supervises the work of specialist officers and takes a close interest in the work of the Empire Courses, from time to time making flying checks on the students. The Examining Wing (W/C. W.E. Coles, D.S.O., D.F.C., A.F.C.) is the central body responsible for the testing and categorization of all R.A.F. flying instructors at home and overseas; it also conducts instrument rating tests and, by visiting units in every Command, ensures that flying training methods are standardized and up to date. The pilots of this Wing are capable of testing instructors on every type of aircraft from jet fighters to flying boats and primary trainers. Their work takes them to Germany, Africa, and Middle and Far East.

Under the command of W/C. R. E. Bell, M.V.O., D.F.C., R.A.A.F., the Development Wing includes the All-Weather Squadron (S/L. P. A. H. McKeand, D.S.O., D.F.C.) and the Research Squadron (S/L. K. P. H. Cliefe, A.F.C.). The All-Weather Squadron has lately been formed to investigate flying in turbulent cumulo-nimbus clouds and to promote, under the direction of the Deputy Directorate of Training (All-Weather), at the Air Ministry, more rapid progress in all-weather flying. It serves as a focal point where questions concerning training and equipment development, and specific problems of Home and Overseas Commands in all-weather training, may receive consideration. The use of radio aids is given constant attention and the work of the Squadron is not to be confined to the United Kingdom. Lancastrians will be used to investigate conditions in the Far East. The principal commitment of the Research Squadron is the statistical analysis of training methods (air and ground) with a view to discovering the most efficient and reliable pilot-training techniques.

Flight Lieutenant Wilson, of the Training Needs and Research Squadron, in the Olympia, now being used by his Unit for assessing the value of gliding as a training aid.

The Instructional Wing (W/C. R. M. McKay, A.F.C., R.N.Z.A.F.) organizes and conducts the Empire Courses, which prepare experienced officers for important flying posts in the Commonwealth Air Forces. Students spend five months at E.F.S. and, since the aim is to broaden their outlook on flying—and on flying



A Theseus-Lincoln was brought over from Bristol by Mr. John Howman. It is seen over Hullavington flying on turboprops alone.

training in particular—their syllabus is wide and varied. Under the supervision of the O.C. Instructional Wing (also known as the Course Commander) the work is carried on by tutors, each of whom has a small group of students with whom he flies and whose ground studies he guides. Assisting the Course Commander is the Senior Tutor (Ground)—S/L. E. W. Merriman, M.B.E., D.F.M.—who is in charge of the Aero Laboratory, housing, among other equipment, the only wind tunnel at an R.A.F. training establishment—an attractive feature of last week's display.

A task of immediate importance now being undertaken at the E.F.S. is the re-writing of *The Flying Instructor's Handbook* and several chapters of *The Royal Air Force Pilot's Flying Manual*.

Since the E.F.S. was formed a large proportion of staff and students have been Commonwealth personnel, and American officers have frequently been attached. The present staff includes the following officers from overseas: W/C. R. E. Bell, M.V.O., D.F.C., R.A.A.F.; W/C. R. M. McKay, A.F.C., R.N.Z.A.F.; Lt. Col. W. A. Polking, D.F.C., Croix de Guerre, U.S.A.F.; Major Truman F. Anderson, U.S.A.F.; S/L. H. W. Lupton, A.F.C., R.C.A.F.; Major J.S.R. Wells, S.A.A.F.

BRITISH AVIATION INSURANCE A.G.M. AND LUNCHEON

AT Londonderry House on Friday, June 25th, the British Aviation Insurance Co. Ltd., entertained to lunch many leading personalities from the airlines and industry. This year the luncheon also marked the 25th year of continuous operation since the formation of the British Aviation Insurance Group. Proposing the guests the chairman, Mr. E. B. Ferguson, spoke of his company's aims and progress and paid a special tribute to the services of Capt. Lamplugh (underwriter and principal surveyor). He specially welcomed among those present the chairmen, managing director and president respectively of four principal airlines. Sir Frederick Handley Page, in excellent form, replied, taking his text from the Book of Ruth.

At the annual general meeting which preceded the luncheon, the chairman stated that for the year ended December 31st, 1947, net premiums written amounting to £583,823 were the highest recorded in the history of the company, and in common with the general experience, claims during the year had been heavier than in previous years. The profit and loss account closed with the balance carried forward to £82,051 compared with £71,405 at the end of 1946, after making provision for the payment of an 8 per cent dividend as before. Total assets, £1,413,064, constituted a record in the history of the company.

Other announcements were that a Miles Messenger aircraft had been purchased during the year for the use of the underwriting services; a branch office had been opened in Calcutta; the South African branch had completed its first full year of operations; and the Canadian branch continued to make progress. Mr. Ferguson has been re-elected chairman and Mr. A. J. Makins deputy chairman.

Guests present at the luncheon were:

Mr. John Booth, Chairman, B.S.S.A.; A. Cdre. H. G. Brackley, General Manager, B.S.A.A.; Dr. H. Roxbee Cox, Director, National Gas Turbine Establishment, President, R.Ae.S.; Mr. Vernon Crudge, Manager, Atlantic Division, B.O.A.C.; Mr. Gerard d'Erlanger, Chairman, B.E.A.; Sir Roy Dobson, Managing Director, A. V. Roe and Co., Ltd., President, S.B.A.C.; A. Cdre. E. H. Fielden, Captain of the King's Flight, Air Equerry to H.M. The King; Mr. Alan Goodfellow, Beaumont and Son, Legal Adviser to B.A.I.C.; Sir F. Handley Page, Managing Director, Handley Page, Ltd.; Capt. J. W. G. James, Chief Pilot, B.E.A.; Major Sir Hew Kilner, Deputy Chairman and Managing Director (Aviation), Vickers, Ltd.; A.V-M. P. C. Livingston, Honorary Surgeon to H.M. The King, Director-General of Medical Services, R.A.F.; Mr. Peter Masefield, Director-General of Long Term Planning and Projects, M.C.A.; Mr. Gordon McGregor, President, T.C.A.; Sir Arnold Overton, Permanent Secretary, M.C.A.; A. Cdre. G. J. Powell, Managing Director, B.A.S., Ltd.; Col. R. L. Preston, Secretary-General, R.Ae.C.; Sir Frank Spencer Spriggs, Managing Director, Hawker Siddeley Aircraft, Ltd.; A. Cdre. Whitney Straight, Managing Director and Chief Executive, B.O.A.C.; Sir Miles Thomas, Technical Director, B.O.A.C.; Chairman, International Airadio, Ltd.; Director, Airways Training, Ltd.

NEW MARKS OF VAMPIRES

SOME information is now available concerning three new marks of Vampire, the 5, 6 and 50. The Mk. 5 is a low-attack version of the Vampire 3, fitted with a Goblin 2 giving 3,100 lb static thrust. Its wingtips are squared off reducing the span from 40 to 38ft, and the main undercarriage incorporates a long-stroke oleo strut similar to that of the Sea Vampire 20.

The Vampire Mk. 6 is similar to the 5, but has a Goblin 3 engine giving an extra 200 lb thrust. It has alternative duties of interception or ground attack, and is intended for export originally for the Swiss Air Force.

Another export version of the Mk. 5 also fitted with the Goblin 3 is known as the Mk. 50, but this is equipped to suit the Swedish Royal Air Force, and is intended primarily for interception duties. All three types are designed to carry the 100-gallon external tanks in addition to full war load.

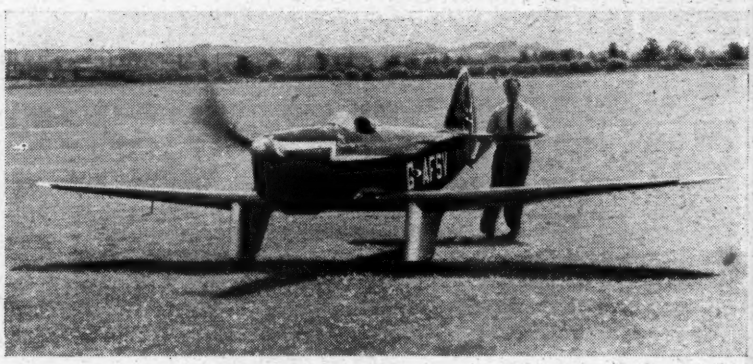
NEWBURY EON DEVELOPMENTS

AFTER some 300 hours of flying, during which time a great many pilots have handled it and expressed their opinions, the prototype Newbury Eon with Cirrus Minor engine completed the first stage of its development on June 18th. Most of the Eon's qualities are now regarded as very satisfactory, but although a C. of A. has been issued it is considered that for three occupants and 20lb. of luggage rather more power is desirable than that given by the 100 h.p. Cirrus Minor.

Last week-end the installation of a 145 h.p. Gipsy Major X was completed, and a new series of flight tests has now commenced. The 50 per cent increase in power should be sufficient to give good performance to a full four-seat version of the Eon. Modifications which have been made during development include a slight increase in rudder area, an increase in aileron span and the incorporation of two-disc Messier hydraulic brakes.

The latest Major-Eon is scheduled to be demonstrated with Olympia Eon sailplane in tow at several air events, including Hamble on July 3rd and Gatwick on July 10th.

HERE AND THERE



"Flight" photograph.

MAN-HANDLING: S/L. R. L. Porteous, Chief Instructor of the Derby Aero Club, brings in his little Chilton monoplane after demonstrating it at the display at Burnaston airport on Saturday last. An account of the event appears on page 7.

Meteor Carrier Trials

A "NAVALISED" Gloster Meteor 3 jet fighter, with Rolls-Royce Derwent 5 turbojets, has completed its initial deck-landing trials on H.M.S. *Implacable*. All twelve landings and take-offs were successful.

Shooting Stars for Germany

SEVENTY-FIVE P-80 Shooting Star jet fighters of the U.S.A.F. will arrive in Germany during August from the Panama Canal Zone. The present U.S. fighter strength in Germany is 75 Thunderbolts.

Assistant Air Attache

MR. E. I. R. MacGREGOR has been appointed Assistant Civil Air Attache at the British Embassy, Washington, in succession to Mr. N. Bicknell, who is entering the Foreign Service. Mr. MacGregor is expected to leave for Washington to take up his appointment towards the end of this month.

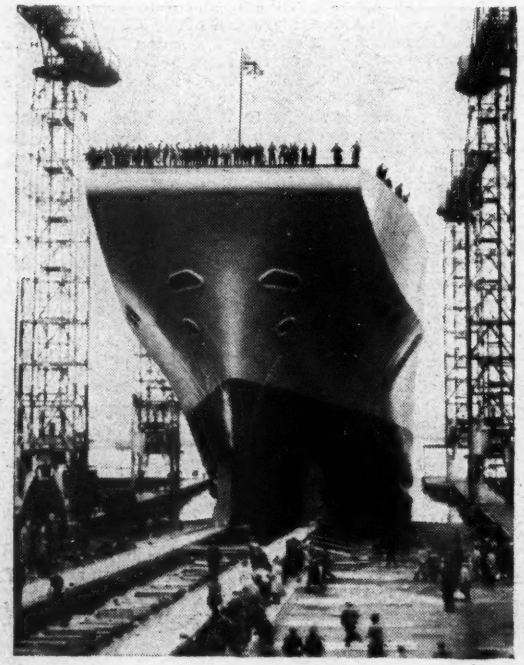
Mission from America

ELEVEN officers of the United States Air Force are on a three-week visit to Britain to study signals training methods in the R.A.F. The visit is a reciprocal one, following last year's mission to the U.S.A. by R.A.F. signals specialists in *Mercury* of the R.A.F. Empire Radio School. The American party, led by Brigadier General E. C. Kiel, arrived at Northolt on June 28th. Headquarters for their visit are the Empire Radio School, Debden.

Rolls-Royce Sales Manager

MR. J. D. PEARSON, who has been associated with Rolls-Royce, Ltd., since 1933, has now been appointed general sales and service manager of the Aero Division. Hitherto he was the company's chief quality and service engineer, an appointment which will now be filled by Dr. E. Warlow-Davies. At the beginning of the war Mr. Pearson concentrated on production problems of the Merlin engine, and later joined the Government Shadow Factory at Glasgow where he eventually became chief technical production engineer. At the end of the war he was posted to Canada in connection with the re-equipment of Trans-Canada Airlines fleet with Merlin-powered DC-4M aircraft, and the establishment of a Rolls-Royce technical office in Montreal, which subsequently became a subsidiary company—Rolls-Royce, Montreal, Limited.

Mr. J. D. Pearson.



BULWARK: The Countess Granville, wife of the Governor of Northern Ireland, launched the new 18,300-ton aircraft carrier "Bulwark" at Belfast on June 22nd. This vessel, seen sliding down the slipway, is a sister ship of H.M.S. "Centaur," launched last year by the Duchess of Kent. Three other carriers are now at Belfast: H.M.S. "Powerful" is laid up, but "Eagle" and "Centaur" are fitting out.

Life-saving Awards

MR. HAROLD BENDING and Mr. Angus Brown, both employees at London Airport, have been awarded the George Medal for saving the lives of two passengers when the Sabena aircraft crashed and caught fire at the airport on March 2nd. Mrs. M. O. Atkinson, of Chatham, has been awarded the British Empire Medal for saving the navigator of an R.A.F. Mosquito which crashed near her home on October 24th last year.

News in Brief

AN "At Home" to other club members will replace the air display at Southend organized for July 17th, which was cancelled subsequent to the Royal Aero Club's decision not to support race meetings owing to the petrol shortage.

* * *

A Supermarine Attacker jet fighter crashed at Bulford, near Boscombe Down, on June 22nd. The pilot—Lt. T. J. A. King-Joyce—was killed.

* * *

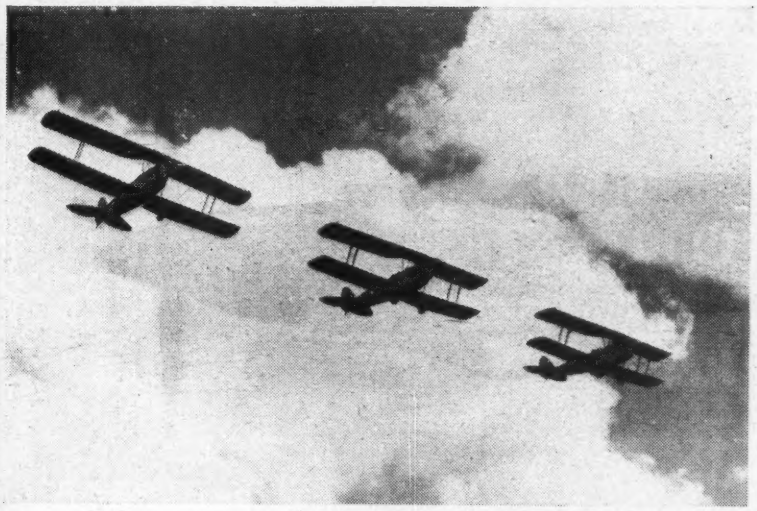
An international air race from Britain to Harewood, New Zealand, is being planned to coincide with a proposed international exhibition to be held in New Zealand in 1953. Prizes totalling approximately £30,000 have been proposed.

* * *

An interesting personality over here for the Olympic Games is Mr. Francis "Goose" Gosling, who during the war served with the R.A.F. He will be one of the leading members of the Bermuda Olympic swimming and diving team, but normally is chief instructor of the recently formed Bermuda Flying Club which runs two Luscombe float-planes.

* * *

Mr. J. W. Adderley has been appointed Technical Liaison Representative in the United Kingdom for A. V. Roe, Canada, Limited, Gas Turbine Division, and will be located at Armstrong Siddeley Motors, Limited, Parkside, Coventry. Mr. Adderley has been associated with the development of the gas turbine engine since 1942 and for the past year has been with Power Jets (Research and Development), Ltd.

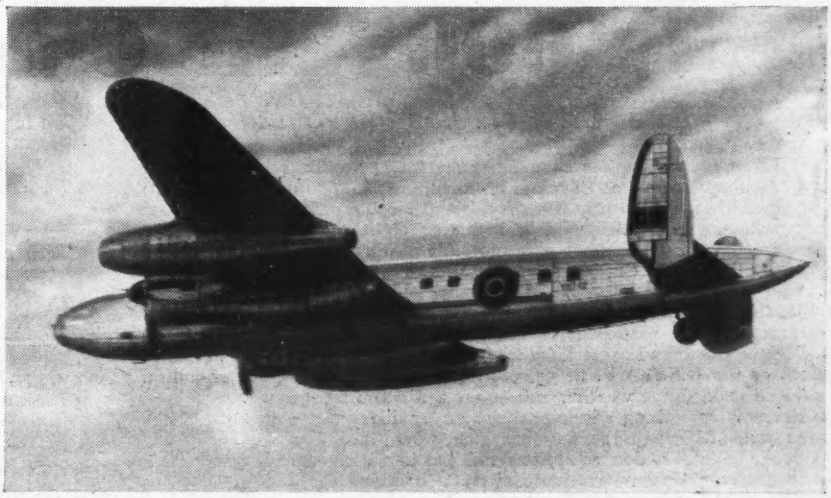


Derby Display

Events to Please All in Well-Arranged Flying Programme

"Flight" Photographs.

CONTRAST: (Left) Three Tigers of No. 16 Reserve Flying School in line abreast, their formation flying was nearly perfect. (Below) Capt. R. T. Shepherd thunders by on the Nene Lancastrian.



A WELL-ORGANIZED flying programme and bright sunshine helped to make the Derby "At Home" and Display last Saturday a very enjoyable affair, and one upon which the Reserve Centre and Flying School together with the Derby Aero Club—the joint organizers—are to be congratulated. It was not the intention that this year's affair should be of the same scope as the 1947 International Rally, but nevertheless a large number of visiting aircraft brought enthusiasts to Burnaston airfield to share the afternoon's entertainment with local visitors.

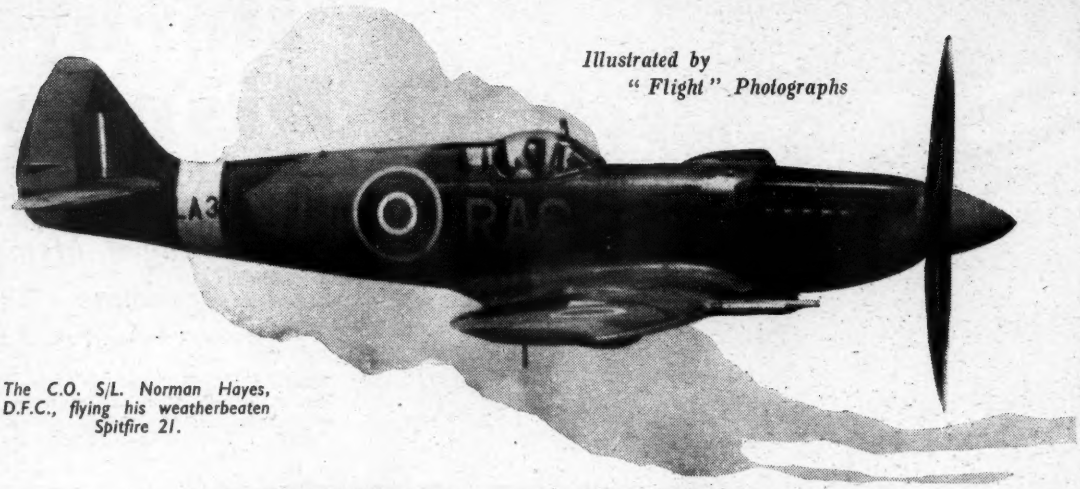
An unusually varied and well-balanced flying programme commenced at 2.30 p.m. after A. Cdre. B. V. Reynolds, C.B.E., A.O.C. No. 64 Group had inspected a Guard of Honour from the Derby A.T.C. Wing, and declared the Display officially opened. Three instructors (F/L.s J. Findlay, W. Wooden, and A. E. Bramson), of No. 16 Reserve Flying School, first gave a particularly good display of formation flying on Tiger Moths. The skill demanded by their performance was particularly appreciated in view of the low level and gusty conditions. There followed a demonstration of the Chilton monoplane by S/L. Porteous, chief instructor of the Derby Aero Club. The excellent performance of this tiny aircraft, coupled with skilful pilotage, never fails to impress. Third on the list was a demonstration of the Chrislea Super Ace, Mr. D. Lowry up, which is now fitted with rudder pedals, but has elevators which answer to up-and-down movement of the wheel control. Its steep climb was noteworthy, and attempts on the part of its pilot to spin resulted in no more than a steep spiral dive.

ON A WING AND A WHEEL: S/L Porteous runs a wheel along the ground during his demonstration of the Miles Messenger. At times he scraped his wing-tip through the grass.

Remembering last year's exciting finish, many people looked forward especially to the race for the Harben Memorial Trophy which was event No. 4. Five pilots in the employ of Air Schools, Ltd., all flying Miles Hawk Trainers, competed. The winner in a close finish was F/L. S. Loveridge, C.I. at Wolverhampton; second was F/L. J. Findlay; and third, F/L. A. E. Bramson. Another popular repeat from last year was a sailplane demonstration in the Olympia Eon by Mr. Jerry Smith, of the Lancashire Aero Club.

Rolls-Royce now took over the programme for demonstrations of an experimental Meteor IV by W/C. Heyworth, of the well-known Nene-Lancastrian by Capt. Shepherd, the company's chief test pilot, and of the Nene-Vampire by W/C. McDowell. As they carried out their manœuvres the pilots gave their own radio commentary, which was relayed through the loudspeaker system. W/C. Heyworth's enormous loops, vertical and inverted climbs, and "non-stop" climbing rolls were as pleasurable as they were exciting, and his excellent performance was rounded off with an aileron turn followed by a high-speed low-level

(*Continued on page 25*)



Illustrated by "Flight" Photographs

The C.O. S/L. Norman Hayes, D.F.C., flying his weatherbeaten Spitfire 21.

"600" In Camp

The City of London Squadron at Work and Play

FOR its second summer camp since the Royal Auxiliary Air Force was "Stood Down" at the close of hostilities, No. 600 (City of London) Squadron has been at Thorney Island for the past fortnight. Over 50 auxiliary personnel attended, including eight officers. The regular squadrons, Nos. 56, 63 and 222, normally stationed at Thorney had all gone to Lübeck in Germany for exercises.

Hard work—both by the auxiliaries and the regular cadre—kept sufficient of the Griffon-engined Spit 21s serviceable to enable the squadron to carry out full battle climbs and formations, and also to take part in a Fighter Command exercise which involved interception of a number of B29s of the U.S.A.A.F. at 35,000ft. Generally speaking the squadron enjoyed good flying weather and about 250 hours were flown.

There is something carefree about an auxiliary squadron. Although the day has gone when the pilots of rival London squadrons did battle with each other on their own private aircraft (bombing each other's camp with flour, soot and extremely long lengths of perforated paper) there is still an indefinable "something" about these camps. Certainly Thorney Island, commanded by G/C. G. B. Keily, D.F.C., A.F.C., is an ideal station for a camp. Surrounded on three sides by the sea, there is sailing, fishing and swimming on the doorstep so to speak, and for those with drier tastes, there is tennis and cricket. Work starts and finishes early and transport is provided for those who wish to go into town.

On the final Friday of the camp the officers invited the whole squadron to a dance and jolly.

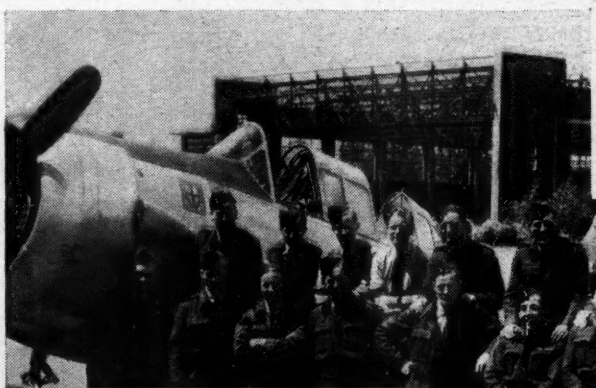
J. Y.

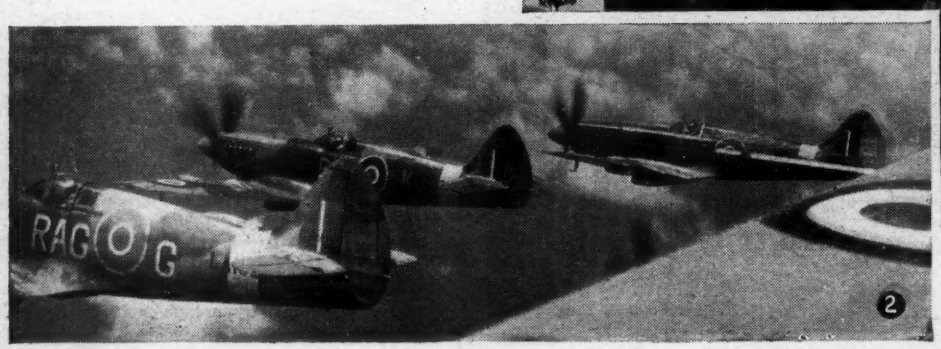
1. Four Spitfires in echelon, led by F/L. Proudlove, flying along the South Coast.

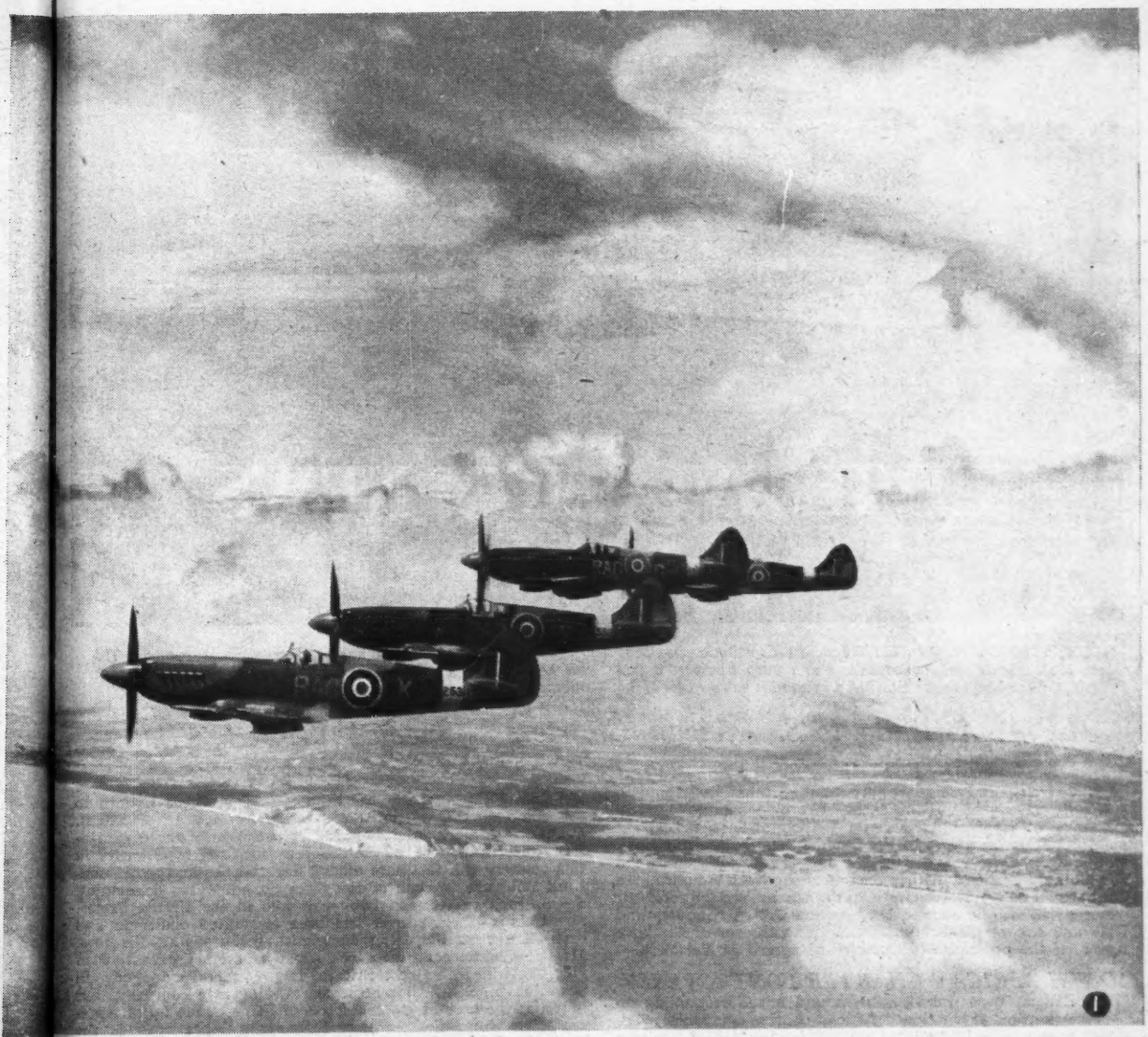
2. Three and one in the box. The latter can just be seen peeping from under the wing of the Harvard from which the photograph was taken.

3. The auxiliary personnel take a few minutes off to pose for a photograph.

4. Pilots of No. 600 Squadron. S/L. Hayes is second from the extreme right.







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CIVIL AVIATION NEWS

SECOND PROTOTYPE ON TEST. The first Constitution has been flying since November, 1946, and has c mpleted all basic testing. This type has a definite civil application and as a troop transport is fitted with 92 airliner-type seats on the top deck and 76 on the lower deck. Weighing over 82 tons, the Constitution has a range of 3,500 miles, a wing span of 189 ft and the fuselage is 156 ft long.

M.C.A. Attitude to S. African Charters : Special V.V.I.P. Viking

ANGLO-ITALIAN TREATY

AN air transport agreement between the United Kingdom and Italy was signed on June 25th. It provides for a reciprocal exchange of rights, and permits British airlines to call at points in Italy on routes to the Commonwealth, the Far East, Middle East, Greece and Turkey; and Italian airlines to call at points on British territory on routes to North America, the Caribbean and to North and South Africa. Reciprocal air services will also be allowed between the United Kingdom and Italy and between Italy and Malta. The agreement has been based on the principles of capacity as agreed at Bermuda.

SOUTH AFRICAN CHARTER CONTROVERSY

THERE has been some confusion and misunderstanding on the position of the South African charter companies who, it is reported, will defy a ban, imposed by the British Ministry of Civil Aviation, on flights to this country. It has been reported from South Africa that the Commercial Aviation Association has asked the Union Defence Minister, Mr. F. C. Erasmus, to intervene in the matter.

The position is that for some time there has been a steady flow of charter traffic from South Africa in such a fashion as to be little removed, if at all, from scheduled operations. Article 5 of the Chicago Convention states clearly that aircraft engaged in other than scheduled operations shall enjoy the privilege of carrying international passengers and cargo subject to limitations imposed by the states concerned. Subsequently each member of I.C.A.O. circulated through the organization a memorandum stating those limitations. The British memorandum, dated December 16th, 1947, was distributed to all members in January this year, and clearly states that all non-scheduled operations by foreign operators shall be subject to a system of special permits for a series of flights or a permit for each individual flight. The limitation was imposed in order to protect the British airlines from piracy from outside, and similar limitations have been included by other countries to protect their own national airlines. A request has been made at government level that South African charter operators shall be made to toe the line after August 1st, and in order to enforce the regulations all facilities at airfields in the U.K. will be refused to South African aircraft on unauthorized commercial flights which are not undertaken as agents or associates of either South African Airways or B.O.A.C.

S.A.S. LIMITED

A LIMITED company has been formed in Great Britain to combine the official air services of A.B.A. (Sweden), D.D.L. (Denmark) and D.N.L. (Norway) into one organization. The formation of the company into one legal entity in this country will facilitate official negotiations and avoid constant reference to each of the three Scandinavian companies. S.A.S. Inc. was formed two years ago in the United States. Mr. Dennis H. Handover has been appointed chairman and each of the participating companies will appoint directors. Mr. V. Christensen, who was previously chief executive of Danish Airlines in Great Britain, is the general manager. In Scandinavia, S.A.S. has no legal standing as a company, but is run at the present moment by committees made up of representatives from the three participants. Copenhagen is the headquarters for traffic, sales, operations, publicity and other branches of the organization with the exception of the S.A.S. charter section, which is based in Oslo. It is expected that there will be further reorganization later in the year. The S.A.S. has so far taken delivery of nine DC-6s, which are at present being used for testing and crew training at Bromma airport, Stockholm. Four more of the type are expected soon.

The first to be operated regularly to London arrived at Northolt on June 22nd on the service which will fly from Stockholm through Copenhagen daily throughout the summer.

BALTIC AIR FREIGHT MARKET

DURING the past few weeks there has been a considerable amount of business in air freight transactions, and the Baltic Air Freight Advisory Committee in collaboration with the British Air Charter Association is making steady progress in the preparation of an Air Freight Charter Party which it is hoped will be generally accepted as an agreed document. The absence of such a predetermined agreement on recognized terms and conditions has tended in the past to slow down and complicate the completion of business transactions, and the adoption of standard documents will considerably aid the development of air freight charter work. While the task of drawing up proforma charter parties and other agreed documents is primarily one for the air charter associations, an Exchange is the appropriate body for ensuring adherence to

Civil Aviation News . . . . .

established practice, and the Baltic Air Freight Section is determined to attain the same degree of mutual confidence and understanding between the various parties and compliance with established practice as already exists in shipping. In addition to these activities, the Air Freight Market has been able to afford assistance to charter firms in utilizing their aircraft to maximum capacity, and already several government departments are co-operating with this body.

HYGIENE ON AIR ROUTES

SIR HAROLD WHITTINGHAM, director of medical services, B.O.A.C., addressed the recent Health Congress of the Royal Sanitary Institute on "Yellow Fever and Air Route Sanitation," and said that a powerful international body was needed to regulate and supervise the sanitation and hygiene of international air routes. Conditions were satisfactory along British and American lines where their own nationals had control, he said, but there were weak links where lines passed through certain foreign territories. He suggested that international control should be vested in the World Health Organization rather than in I.C.A.O., because hygiene measures needed to be extended to surrounding habitations, villages and towns for at least a mile from the perimeter of the airfield.

VIKING FOR PAKISTAN'S GOVERNOR

A V.V.I.P. Vickers Viking, similar to those which form the King's Flight, left England on its delivery flight to Pakistan on June 15th. It is intended for the use of Mr. Jinnah, Governor-General of Pakistan, and has been slightly modified to include larger staterooms which provide sleeping accommodation. There are six windows in the saloons, interior temperature of the aircraft is thermostatically controlled and each compartment is equipped with an electric fan. The aircraft carries a crew of two pilots, a radio operator and a navigator, and provides accommodation for eight seated or four sleeping passengers, three equerries and a steward. In addition to the equerries' quarters, behind the aft stateroom, are two toilets and a galley which is equipped with a refrigerator operated by the use of frozen dioxide blocks.

BREVITIES

Four Short Solents are to fly on the Tasman Empire Airways route between New Zealand and Australia, and the first one is expected by T.E.A. in December.

* * *

India is to operate ten air routes and Pakistan nine, under a permanent mutual air transport agreement signed recently in Karachi and which becomes effective today, July 1st.

* * *

During a recent parliamentary debate on defence in Ottowa, a suggestion was made that the Canadian Government should ask British aircraft manufacturers to establish factories in Canada. The Government spokesman, however, stated that tooling costs made the suggestion unworkable.

* * *

Western Australians have asked the State Premier, Mr. Duncan McLarty, to present a scheme to the British Empire Parliamentary Association Conference meeting in London next month urging the operation of a new Empire air route from Perth across Africa to London. The proposed route is via the Cocos Islands, Diego Garcia, the Seychelles Islands, Nairobi, Kano and Gibraltar.

* * *

K.L.M. services to Palestine have been resumed with a twice-weekly DC-3 flight to Haifa. Lydda was the airport previously used by the airline.

* * *

The North Pacific Regional Air Navigation Meeting will begin at Seattle on July 13th. Ten I.C.A.O. members interested in the Pacific area will attend.

* * *

Trans-Ocean Airlines of California have asked for landing rights to enable them to fly American immigrants from San Francisco to Brisbane via Guam, and the proposal is now being considered by the Australian Government. The American airline already operate a regular service to Guam, and they now wish to extend the route to Australia. On the return journey the company plan to fly milk from Queensland to Guam.

* * *

Mr. William F. Muller has been elected president of the Air Express International Agency Inc., and its subsidiary company, Air Express International Inc. The company is managing agent for Lep Transport Inc. which is, of course, connected with the Lep Group in England with its 65 associated companies. Mr. Muller was previously European traffic manager in A.O.A. After the 1914-18 war he was associated with Handley Page and later with Swissair.

* * *

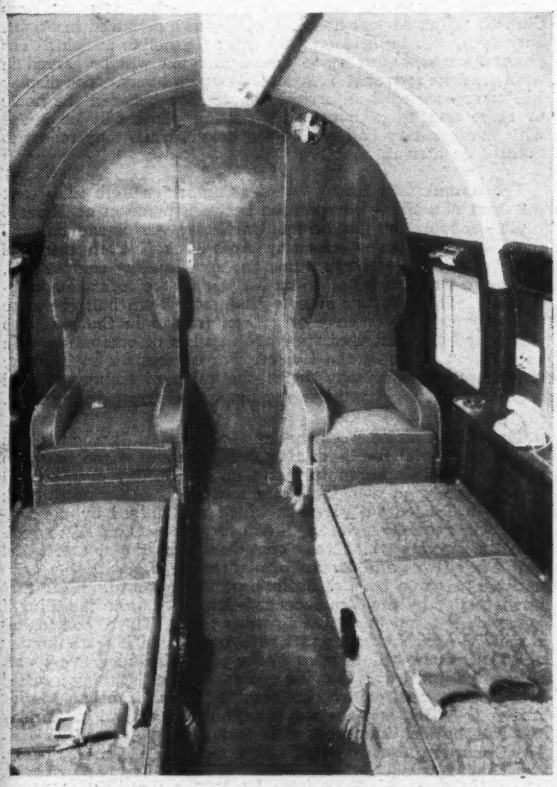
A group of experts left Rome recently for the United States to study developments in airport construction. This move has been dictated by the urgent necessity for a new airport for Rome caused by rapidly expanding Italian air services and the heavy international traffic passing through the capital. Rome's main airport is Ciampino, which is devoted mainly to international traffic, amounting to about 350 arrivals and departures each week. The buildings were badly damaged during the war. Internal Italian services operate mainly from the former Littorio airfield, now called Urbe, which handles about 300 movements weekly.

* * *

Between them, American Airlines and American Overseas Airlines flew in 1947 a total of 1,708,884,000 passenger miles. Of this total American Airlines, the domestic carrier, flew 1,502,499,000 passenger miles between December 28th, 1946, and the end of 1947, and A.O.A. flew 206,385,000 passenger miles from October 3rd, 1946, until December 31st last year. Operations throughout the year were carried out without fatality to crew or passengers, and for this performance the airlines have gained the American National Safety Council's safety award for 1947. The huge total of 6,093,761,000 passenger miles was flown in 1947 by airlines within the United States.

* * *

Testing of anti-icing equipment on the Boeing Stratocruiser is now in its final phase. More than 400 hours of flight testing have been accomplished with three aircraft, the first of which has completed almost 250 hours. The C.A.A. have completed tests for climbing, general performance, stalling, control characteristics, engine cooling, engine accessory opera-



V.V.I.P. COMFORT: In the Vickers Viking recently delivered to the Governor-General of Pakistan, each of the two aft seats in the two saloons can be converted into a bunk, thus providing sleeping accommodation for four passengers.

Civil Aviation News . . . . .

tion, landing and take-off. By the end of June it was expected that the C.A.A. would start the function and reliability phase of simulated airline operation.

* * *

From July 20th the Finnish airline Aero O/Y will fly services between Helsinki and Amsterdam. By arrangement with K.L.M. the service will be flown exclusively by the Finnish airline, but seats will be reserved on that route for European operators and K.L.M. have agreed to reserve seats to European capitals for travellers from Helsinki.

* * *

Arrangements have been made to replace the taxiway lighting on existing taxiways at London Airport with an improved fitting giving a greater light output. The new fittings will be provided with blue filters so that taxiway lighting on both sides of the taxiways will show blue light. Work on the installation commenced on June 23rd on the taxiway from the western end of runway 280°. While this work is in progress the blue lighting will progressively replace the existing blue and yellow lighting on the taxiways.

* * *

The McKee Trans-Canada Trophy for 1947 has been awarded to Captain B. A. Rawson, director of flight development, Trans-Canada Airlines, in recognition of his outstanding contribution to the advancement of aviation during 1947, and for his excellent record of achievement during an association of 22 years with aviation development in general. The Trophy has been awarded annually since 1927 for meritorious service in the advancement of aviation in Canada.

FROM THE CLUBS

AN International Air Rally has been organized by the Aero Club de Suisse for July 24th and 25th at the Blecherette airfield, Lausanne. Officially it will be known as the "Rallye Aerien International de Lausanne-Montreux-Riviera Suisse." Special invitations have been extended to pilots from this country and full particulars can be obtained from the Royal Aero Club Aviation Centre, Londonderry House, 19, Park Lane, London, W.1.

* * *

During May the Midland Aero Club flew over 180 hours in club aircraft. Four members made their first solos and eight passed their "A" licence tests. Quite a number of long-distance flights were made, and members took advantage of the long daylight hours. A party flew on June 5th to Weston-super-Mare, stopped about 4 hours by the sea and returned to Elmdon by 21.00 hours. On June 12th another party visited Blackpool, after making the cross-country flight in poor weather conditions.

* * *

The annual general meeting of the Leicestershire Aero Club, Ltd., was held at the Oriental Hall, Market Place, Leicester, on June 29th at 6 p.m. During the year 154 instructional flights have been made, together with 417 other flights, including solos, passenger carrying or testing and 130 cross-countries. The total flying time for the year was 192 hours 45 minutes on club machines; this was more than doubled by hours flown by private owners on their own machines.

* * *

More than 70 aircraft, carrying over 200 members of the Royal Aero Club, are already entered for the Deauville Air Rally over the week-end July 3rd to 5th. It is understood that there is also a waiting list numbering more than 80. Owing to accommodation difficulties, which everyone will appreciate, M. André had arranged social events exclusively for the members of the Aero Club, for whom the Rally is organized, but representations were made to him when he was here for the Gatwick Rally by members who last year enjoyed so much the opportunity of meeting many French enthusiasts, and he is to try to arrange a similar get-together this year. Deauville Aviation will award a Cup for the competitor who crosses a line on the airfield nearest to a predetermined time. The times of arrival will be allocated to allow 3-minute intervals starting at 11.30 hours.

* * *

Herts and Essex Aero Club ran the first post-war competition for the "Janet, Lady Brickwood" Challenge Cup on May 30th. There were 14 entrants for the event, which took the form of a forced landing competition, and the winner was Dr. H. da Costa. On June 13th the club ran a Junior cross-country competition, limited to members with less than 20 hours solo, and from a field of 8 competitors Mr. P. J. Detmold, chief engineer of Kearsley Airways, was the winner. The next competition for the "Shelmerdine" Challenge Bowl presented by the late director-general of civil aviation, will be flown on July 4th and will be open to all pilot members. The competition will be a cross-country flight over a triangular course with the track of the last leg forming an arc between the second turning point and the airfield, and passing through an undisclosed position marked on the ground by a white cross, and which must be discovered by competitors. A Breakfast patrol for the near future is being organized. Six Herts and Essex aircraft have been entered for the Caen rally.

Some interesting recently joined private-owner aircraft are Mr. Franklin's Gemini, Mr. Velten's Auster, Mr. Pini with the original Mohawk built for Col. Lindbergh, and Mr. Frogley's Leopard Moth. Work on the new hangar which will replace that destroyed in the fire in June last year has now started.

* * *

The Yorkshire Aeroplane Club's "At Home" will be held at Sherburn-in-Elmet on July 11th, and there will be a patrol and time of arrival competition for visitors arriving between 12 and 12.30 p.m. Other events during the day will be bombing and landing competitions. There will be a special prize for the worst-dressed visitor.

* * *

A member of the Cowes Flying Club, Mr. Anthony Guetta, who had flown less than 20 hours solo, recently flew alone to Gibraltar in a hired Auster. The aircraft was fitted with an overload tank amidships to enable him to fly the following route: Lympne, Le Touquet, Deauville, Rennes, Nantes, Bordeaux, Toulouse, Perpignan, Barcelona, Valencia, Seville and Gibraltar.

* * *

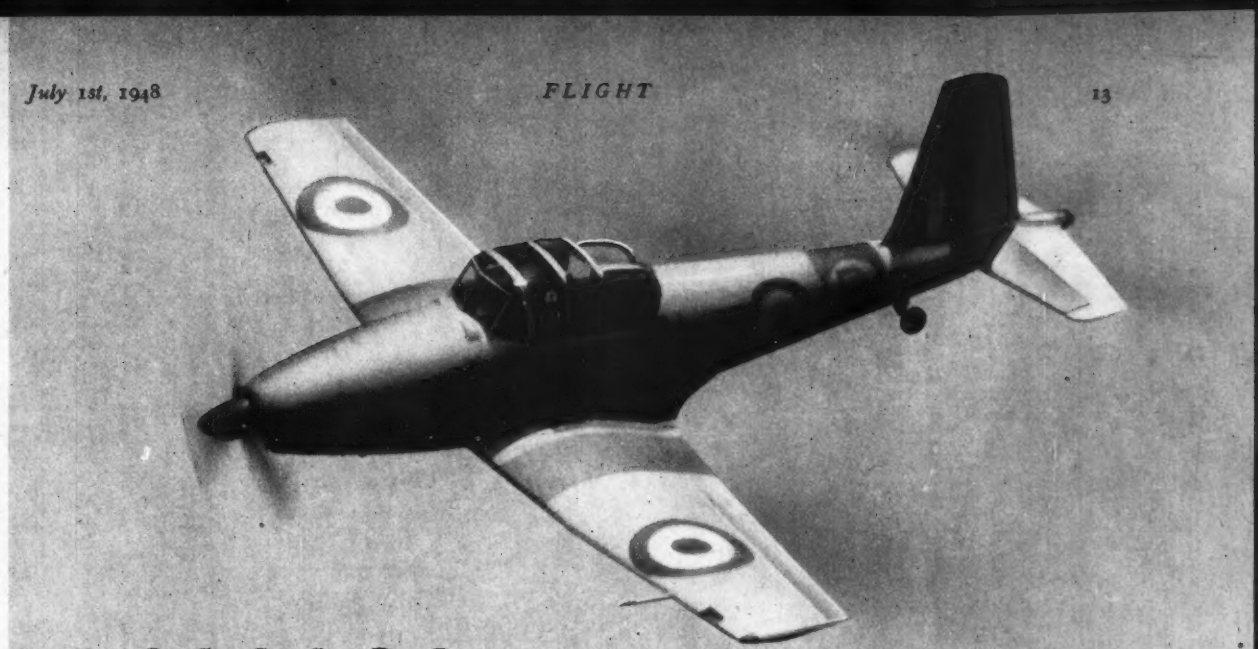
Further details are now available of the Leicestershire Aero Club air rally and "at home," which, as announced in *Flight*, May 27th, will be held on July 4th at Ratcliffe airfield. The programme begins at 15.00 hours, and tea will be served in what was the former A.T.A. Mess at 17.00 hours. The display will commence with an arrival competition between the hours of 15.00 and 15.30 hours and visiting pilots will be issued with the necessary badges and tea tickets when they report to Control on arrival.

* * *

The second "At Home" of the Cambridge Aero Club took the form of a flying competition between pilots of 22 Reserve Flying School, the Cambridge University Air Squadron, and the Cambridge and University Aero Clubs. Club members took part in the treasure hunt, the spot landing competition, and gained second place to 22 R.F.S. in the formation competition It is worthy of note that more than half the Aero Club representatives have only been trained in the past two years, and the fact that they are capable of competing with experienced pilots of the Reserve Forces seems a satisfactory answer to any who may doubt the value of training offered by flying clubs. A total of 152 hours was flown during May.

* * *

The Butlin aerial week-end at Skegness on June 11th was highly successful and was attended by about 6,000 or 7,000 people. Aircraft began to arrive on the Friday evening and approximately 30 machines were mustered. All aircraft took part in a Concours d'Elegance which was judged by the visitors. On specially printed cards everyone was asked to indicate the aircraft which they considered was the smartest and best turned out and by an overwhelming majority the competition was won by Mr. Butlin's personal Consul. Since that was regarded by the organizers as being "not quite the thing," however, the first prize was awarded to Mr. Tim Wood for his Rapide G-AHTY, the aircraft with the second highest number of votes. Competitions open to the public included fast-speed, slow-speed and height judging contests. The Saturday's sealed arrival cup was won by Mr. Blankley from Grantham, flying Auster G-AIGO, and the cup for the sealed arrival on Sunday was won by Mr. Crampton, of Lincoln, flying Auster G-AJEK. Mr. Crampton also won the Auster race, with Mr. G. Snarey, the chief test pilot of the Auster Aircraft Company second. The third place was won by Mr. W. E. Lawton, of the Wolverhampton Aero Club. Mr. G. Snarey, flying an Auster Arrow, won the open handicap race in which Mr. Lawrence, chief test pilot of Blackburn's, was second in a Proctor. Mr. Bennett of Rollason's flew a Proctor and gained third place.



BALLIOL

First Airscrew-Turbine Powered Trainer in the World to Fly : Three-seater Trainer With Excellent Design for Maintenance

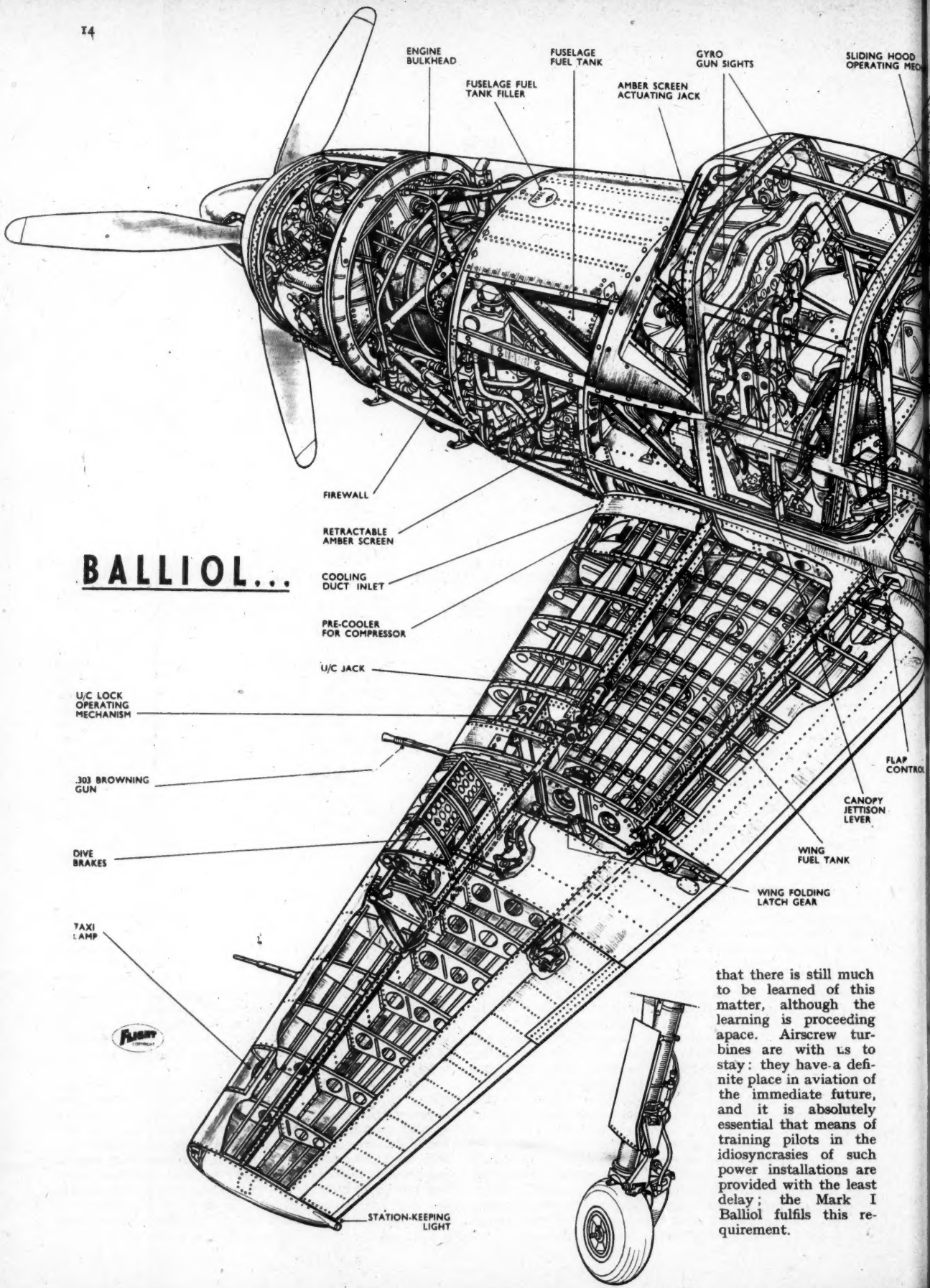
THE march forward which has taken place in the development of aircraft during the past decade has been such that, not only have the numerous ancillary fields been affected, the fundamental business of flying has itself undergone a change. This is not to say that the handling of a Tiger Moth to-day is any different from what it was in 1938: flying is still flying—nevertheless the manner of it has altered somewhat, and modern military aircraft do demand a pilot ability rather different from that required in those spacious days of ten years ago.

Necessarily, this must have its effect all the way down the line, and the general training policy now seems to be that, right from the *ab initio* stage, a pupil pilot should be made familiar with the controls, instruments, services and broad flying characteristics with which he will find himself in operational maturity. Obviously, an elementary training aircraft will not embody the complexities which bedevil the front-line types, but, nevertheless, the general sense and atmosphere of the elementary trainer (from the pupil pilot's viewpoint) should provide him with an introduction in familiarity to the more advanced types he will, in due course, encounter. Standardization of instruments, primary and auxiliary controls, etc., afford some help in this regard, although it is exceedingly difficult to carry cockpit standardization much beyond this. As far as cockpit layout is concerned, the policy of employing the three-seat, clover-leaf plan, in which the pupil sits in the port seat with the instructor by his side in the starboard seat, and the centrally placed rear seat occupied by a second pupil "sitting in" and watching points or, perhaps, doing some useful navigating work, has much to commend it.

This form of accommodation layout was called for in Specification T7/45, to which the Boulton Paul Balliol Advanced Trainer was designed, as a logical extension to the specification which resulted in the Percival Prentice elementary trainer, which also features a clover-leaf seating plan. The Balliol is intended to provide a natural transition for the pupil pilot advancing from the Prentice and, on examination, there can be little doubt that to this end the design of the Balliol is considerably successful. The specification was not a particularly difficult one to fulfil, but had it been even simpler than, in fact, it was, the design would still command approbation, particularly for the ingenuity exercised in evolving an aircraft in which considerations for maintenance accessibility have been given a higher place than, perhaps, that given in any other aircraft yet built. In addition to these basic qualities of design, the Balliol must also be accorded the palm for having been the first turboprop trainer ever to have flown, the first successful flight having been made on May 17th, this year, from Bitteswell, with S/L. Price-Owen, chief test pilot of Armstrong Siddeley's engine flight development section, at the controls.

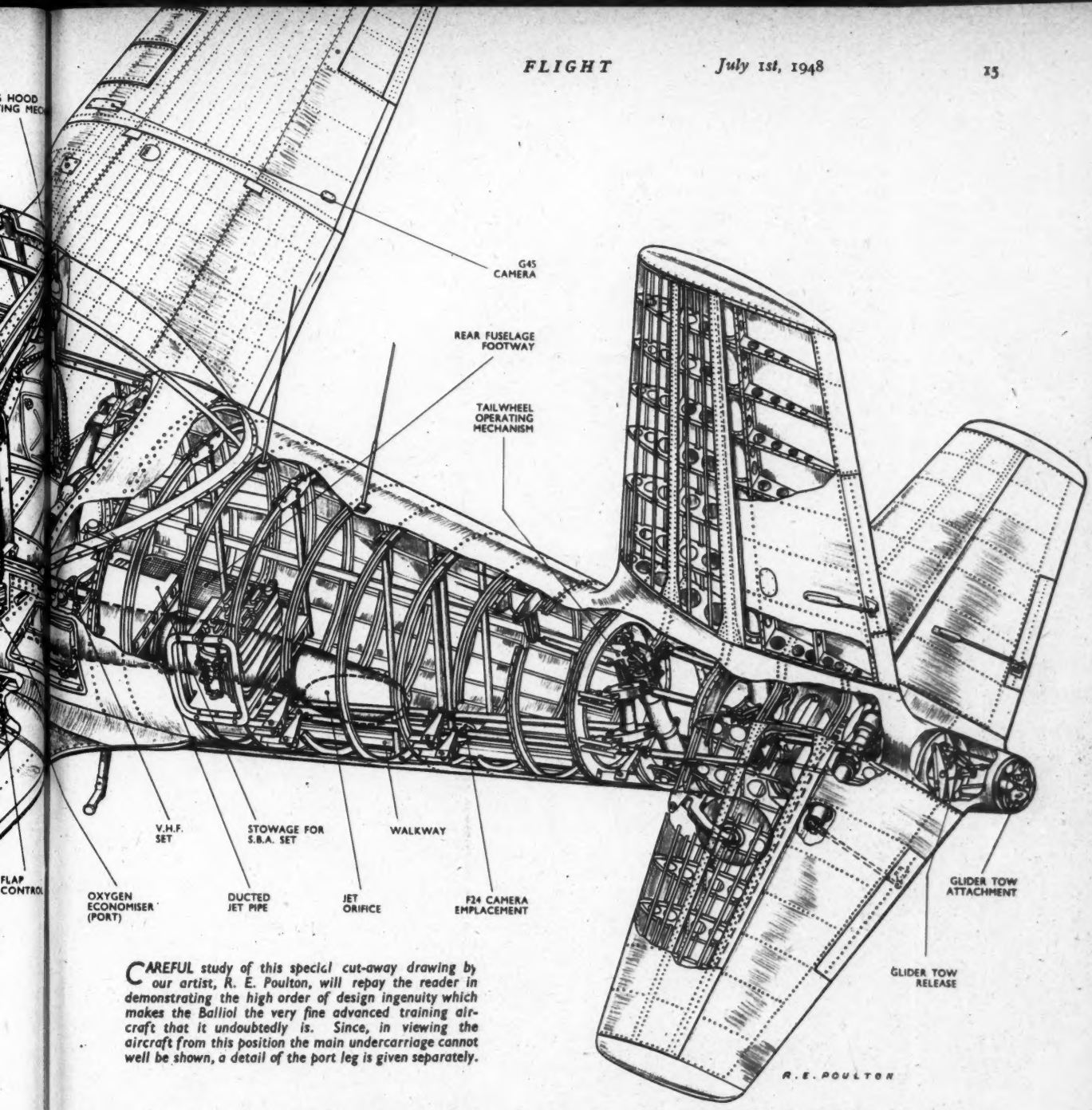
Work on the Balliol was first started in the early part of 1946, and approximately twelve months later the first flight of the aircraft took place. At that time, the airframe was much more advanced than the Mamba airscrew-turbine, and, solely in order to allow some air experience to be obtained, Boulton Paul's installed a Bristol Mercury engine, and it was in this guise that the aircraft first flew. These initial flight trials showed up very few snags (and all of these were minor ones), and thus it was that, by the time the Mamba was ready for installation, the aircraft *per se* had already received some development.

Present flight trials, with the Mamba Balliol, are concerned chiefly with establishing a handling technique. An airscrew turbine cannot be controlled in the same manner as that used for a piston engine: the fundamentally different principle of operation makes this readily understandable, and although the Mamba is now operating with a considerable degree of reliability, the final details of handling procedure have yet to be crystallized. This is neither the time nor place to go into the niceties of airscrew turbine control, and we must content ourselves with stating



BALLIOL...

that there is still much to be learned of this matter, although the learning is proceeding apace. Airscrew turbines are with us to stay: they have a definite place in aviation of the immediate future, and it is absolutely essential that means of training pilots in the idiosyncrasies of such power installations are provided with the least delay; the Mark I Balliol fulfils this requirement.



CAREFUL study of this special cut-away drawing by our artist, R. E. Poulton, will repay the reader in demonstrating the high order of design ingenuity which makes the Balliol the very fine advanced training aircraft that it undoubtedly is. Since, in viewing the aircraft from this position the main undercarriage cannot well be shown, a detail of the port leg is given separately.

A detailed description of the Armstrong Siddeley Mamba was published in our issue of March 18th, 1948, and we do not, therefore, intend to consider this aspect of the aircraft beyond a brief survey of the installation. Immediately noteworthy is the neat manner in which the Mamba mates with the airframe, and the relative simplicity of the union.

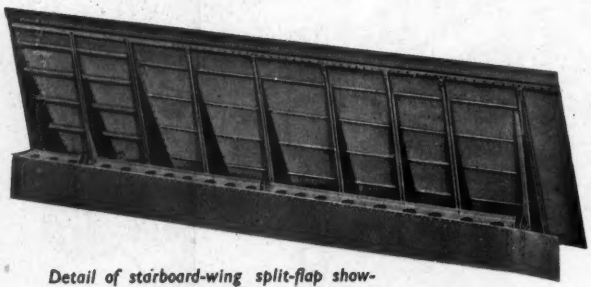
The Mamba is supported at three points on the delivery casing from compressor to combustion chambers, tubular mounting struts extending back from these three points to four anchorage forks on the firewall, which latter takes the form of a disc diaphragm surrounding the jet pipe shroud. Engine mounting loads are transferred from the firewall back into the main fuselage structure by similar steel tubes running from the firewall anchorages back to the fuselage longeron terminals. At the base of the firewall is mounted an accessory gearbox driven by an extension shaft from immediately behind the airscrew reduction gear, the accessories respectively being the generator, Pesco vacuum pump and Hymatic compressor. Between the firewall and the cockpit bulkhead, the jet pipe is slanted to run downward under the cockpit floor, and above the pipe is housed the fuselage fuel tank, supported on a tray carried on the upper engine-mounting struts. On the starboard side, the main electrical distribution panel is located, and complementing this to port are grouped all the reducing valves, charging points, etc., for the various pneumatic services, whilst the bottle for the Graviner fire-suppression system serving the engine is carried on the front face of the cockpit bulkhead. These are representative instances of the forethought given to ease of maintenance: in this connection, no less than forty access apertures are provided for servicing and maintenance, and, wherever possible, such panels are provided with Oddie quick-release screw fasteners.

The fuselage from the cockpit bulkhead aft is divided

BALLIOL . . . .

into three sections, viz., front fuselage, rear fuselage and tailcone. The front fuselage is built up around four box-cum-top hat section longerons, spaced approximately at 90, 120, 150 and 180 deg. and complemented by semi-longeron members at 60 and 300 deg. in the shape of heavy extrusions which also form the rails for the sliding canopy. Between these rail/longerons and the side longerons at floor level are sub-frames, and also acting as major ties in the structure are the very robust built-up box-section arches forming the front-screen trailing-edge member and the crash-arch between the front and rear seats. A third major structural member in the upper portion of the front fuselage takes the form of a "horseshoe" frame canted back at about 40 deg. to the horizontal and running up from floor level to the top of the turtle-deck at the rear of the after canopy. This frame is built up with angle booms and a plate web. The whole of the canopy is constructed as separate sub-assemblies fabricated in relatively heavy gauge light-alloy sections.

In his article published in our last week's issue, Wing Cdr. Maurice Smith paid tribute to the roominess and comfort of the cockpit, and, without dilating too much on this aspect of the aircraft, the neatness which characterizes the general arrangement and the manner in which everything comes readily to hand is most commendable. Artificial blind-flying conditions by the use of amber-tinted



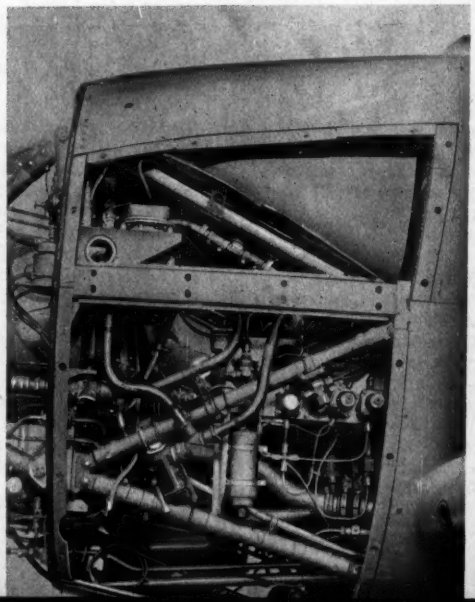
Detail of starboard-wing split-flap showing the simple and robust construction.

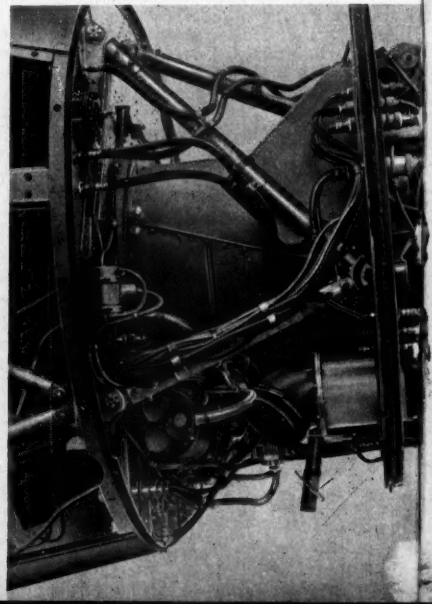
screens (with the pupil wearing blue-tinted goggles) is the modern equivalent of the stuffy, uncomfortable canvas hood we knew in past years, and to Boulton Paul must be given the credit for devising a further refinement to this already refined system. The amber filter screens slide in rails formed in the ordinary front screen framework and are raised into position by actuation of a pneumatic jack fitted behind the central glazing bar. A push button controls the delivery of compressed air to the jack, extension of which raises the filters via a system of cables and pulleys against the tension of an elastic cord. At its limit of travel, the jack rod is locked by a spring-loaded latch, and, when it is desired to lower the filters, a release lever withdraws the latch via a Bowden cable and allows the elastic cord to contract and so lower the screens. The upper glazing of the front screens is permanently amber stained, this also applying to the roof-glazing of the sliding hood: the side windows of the sliding hood are fitted with amber screens which, when required, can be drawn forward from their normal rearward position.

A roomy and well-designed cockpit is a prime feature of the Balliol.

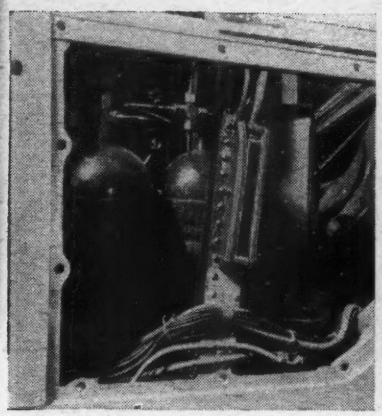
No centre section in the accepted sense is used in the Balliol; the wing spars attach direct to fuselage spanning members, and these, together with two box-section fore-and-aft beams, which carry the seat loads, form the heart of the grid framework on which the cockpit floor is built up. The flank skinning below floor level down to the lower longerons is carried on I-sub frames with Z-section stringers. The belly skinning between the lower longerons is largely made up of access panels which meet at a crash-skid keel. This crash skid is a built-up box member running aft from the base of the firewall and carried on three rubber shock-buffers, one at the base of the cockpit bulkhead and one at the base of each of the spar bridge-members: an effective buckler against too much damage in the case of belly landings. Those members which, spanning the fuselage, bridge the wing spars, are made up with I-section forged booms and diaphragm webs, the latter being pierced and the booms bowed to afford central clearance for the jet pipe shroud. (The jet pipe, incidentally, in its run throughout the fuselage, is shrouded with an enclosing casing, the cavity between pipe and casing being filled with aluminium foil and, in addition, forced-draught cooled.) An unusual feature of the wing/fuselage attachment in the Balliol is that the pin joints which unite the spar bridge booms to the spar booms proper are bushed in the lug-and-fork fashioned ends of the booms themselves: no separate end fittings are used.

On the starboard side of the rear seat, the cockpit floor is cut away, a foot platform forming the base of the well thus made giving access to the various radio and radar sets stowed behind and to port of the rear seat, and to

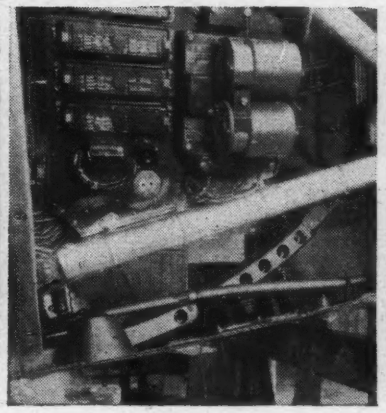




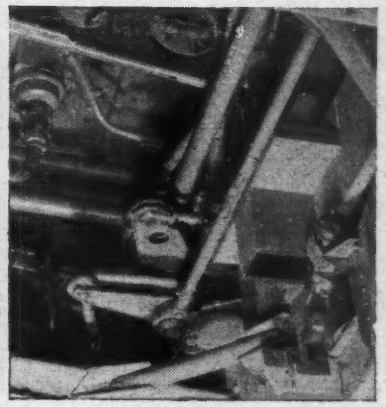
(Left) Port side engine root mounting showing centralised pneumatics and top fuel tank. (Right) Starboard view of forward mounting showing jet pipe shroud and gearbox-mounted auxiliaries beneath.



Oxygen cylinders and pipes are accessible through aperatures in the port side of the fuselage.



All fuses for general services are grouped beneath a panel on the starboard side of the fuselage.



All controls are provided with adjustment points which are adjacent to suitable access apertures.

Boulton Paul Balliol . . . . .

the accumulators which are carried on a separate tray assembly to port, extending rearward at floor level.

Front and rear fuselage sections are united at a transport joint made with heavy gauge angle hoops, the free flanges of which are bolted together at about 3in centres. The rear fuselage is a plain, cone monocoque, stabilized with lipped 2-section stringers, on the free flanges of which ride the lipped Z-section frames, these being bolted to the stringers with Nettlefold lock nuts. Stringers have a mean central pitch of about 4in, whilst the frames are spaced at approximately 14in centres.

The jet tail pipe emerges through the lower flank of the rear fuselage on the starboard side immediately rearward of the wing root fillet, the aperture in the skin being reinforced with an external doubling plate. Lapped joints are used throughout in the fuselage skin plating. A further walkway is embodied in the after-portion of the rear fuselage in the form of a corrugated plate supported on Z-stringers spanning the frames. This serves the emplacement for the F/24 camera, for which an aperture is provided in the keel skinning about 18in behind the jet orifice: local stiffening in way of the camera position is provided by four vertical tubular struts spanning the frames.

Between the rear fuselage and the tailcone is a similar transport joint to that between the front and rear fuselage sections, but the tailcone departs from the pure monocoque structure in having portions of its panelling pre-formed as integral fillets for the fin and tailplane. The skinning is supported on 2-section stringers with relatively massive built-up box frames, the foremost of which serves as the upper anchorage for the tailwheel strut, the base anchorage for this being provided by the next rearward frame. In way of the fin rearpost, the tailcone frame is a split top-hat-section box, from this station rearward the frames being built-up boxes at tailplane front and rear spar stations. In the tailcone extremity is housed the Malcolm gear for glider-towing.

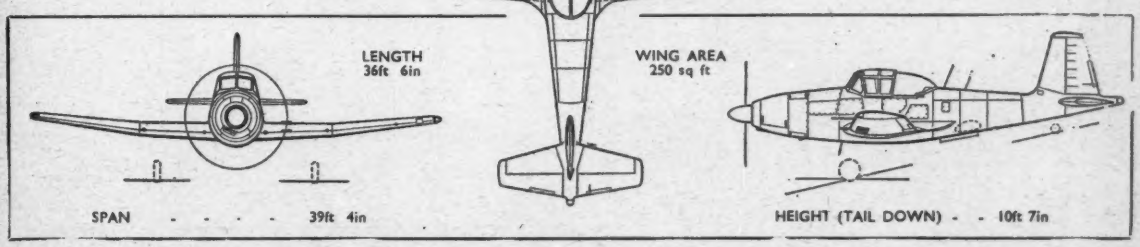
Although not specifically a maintenance item, the fact that the fin and tailplanes are interchangeable and that the elevators are interchangeable, is a valuable contribution toward maintaining a high level of serviceability. Fin and tailplane surfaces are fabricated with light, built-up I-section spars, the webs of which are pierced with swaged holes and spanned by pressed-sheet chordal-ribs which are notched for passage of the 2-section stringers. Skinning is applied in single panels per side, butt-jointed along the leading edge with an internal butt strip. The after face of the rear spar is fitted with fillet strips to form shrouding for the control surface.

Each elevator has light pressed channel-section front and rear spars with chordal ribs of similar form, the skinning being applied in the same fashion as used for the tailplanes and fin. The elevator torque tube is built in halves joined on the fuselage centre line and extending out to port and starboard to pick up flange-reinforced holes in the nose portions of the elevator ribs. The rudder structure is precisely similar to that of the elevators. Mass balancing is given by lead weights carried on lever arms off the elevator and rudder torque tubes inside the fuselage tailcone.

Wing Structure

As already mentioned, a centre-section is not employed in the Balliol wing structure. The wings are made in inner and outer panels port and starboard, the joint occurring at the wing-fold hinge-line. To deal with the inner wings first, these are built around two diaphragm spars employing angle-section booms, which, unusually, are hand-forged from billets and subsequently machined on flanges and at the ends for attachment lugs and forks. Inter-spar ribs are light pressed diaphragms, the webs of which are cut away to form a tunnel for housing the fuel tanks, with their contour flanges notched for passage of the Z-section stringers which stabilize the skin plating. Aft of the rear spar is a light channel false spar giving support to the trailing-edge skinning and also serving as the anchorage for the flap hinges. Upper surface skinning over the flap recess is carried on cantilever ribs off the false spar and stabilized with span-wise 2-section intercostal stringers.

The leading edge of the inner wing is in two portions, the innermost of which contains the undercarriage retraction well. Built up on pressed sheet chordal ribs spanned by Z-intercostal stringers, the skin is a single wrapping, whilst the undercarriage well is made with swage-stabilized "walls" and "roof." The outboard portion of the inner wing leading edge is formed by the undercarriage actuating box and, immediately outboard



Boulton Paul Balliol . . . . .

of this on the port wing, the ammunition cell serving the .303 Browning gun installed at the hinge break. The undercarriage box is a very massively built component, through which are taken all undercarriage loads. It is fabricated with heavy end ribs spanned by cast plates, themselves joined by a bridge plate and housing the self-aligning bearing bushes in which the undercarriage legs are pivoted. In the rearward portion of the box is housed the cam gear for actuating the down- and up-locks. The box is closed at the trailing edge by a heavy web plate and at each corner are hefty forged sockets into which register spigots off the wing spar, the box being locked in position by screw pins which pierce the spigots. The cam gear for sequence actuation of the undercarriage locking seems to be unnecessarily complicated and this criticism can be levelled at other points in the Balliol design.

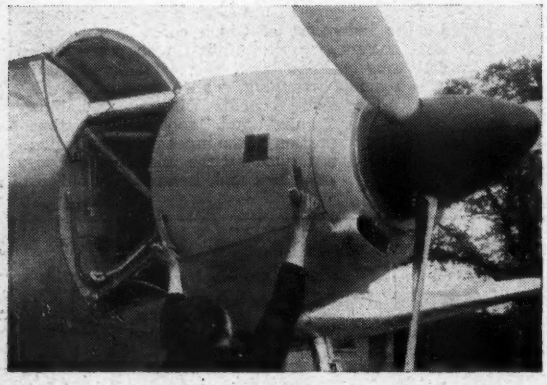
We always hesitate to advance criticism without being fully convinced of its justification and, although there may well be grounds for the design staff of Boulton Paul Aircraft having taken the solutions they have to the various detail design problems, we feel that the dissonant postulate coined by Stout, "Simplicate and add more lightness," is, despite its Runyonesque terms, well worthy of heed.

Sealed-Balance Ailerons

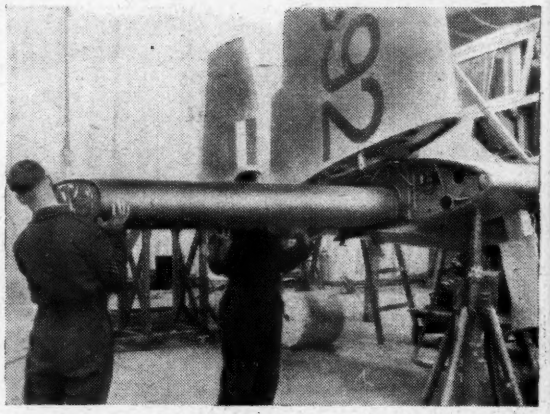
The outer wing spars are similar in form to those used for the inner wing panels, but the inter-spar ribs have their diaphragms pierced with swaged lightening holes and ride on the free flanges of close pitched Z-stringers which, with 16-gauge skin out to the aileron and 18-gauge panelling from there to the tip, makes a very rigid torsion box. The N.A.C.A. 65 aerofoil section is of moderately thick t/c ratio and has the trailing portion of its upper contour very slightly reflexed. It can be considered as mildly lamina flow section and, although the speed of the Balliol does not make this quality very important, it is, nevertheless, a good point. At the inboard end of the outer wing panels, the leading edge has doubled diaphragm ribs and slots in the skin for the dive brakes, these being simple, holed membranes extended on radius arms by a scissor linkage from a torque tube. When retracted, the dive brakes nest, one behind the other, just forward of the front spar. The rest of the leading edge has single diaphragm nose ribs and is skinned on 2-section intercostal stringers.

Ailerons are of sealed balance type, the leading edge nose being formed with a spine flange to which is attached a sealing membrane of rubberized fabric extending forward to the centre of the rear spar web and thus dividing the nose-shroud balance-volume into two. The spine flange necessitated with this type of aileron serves a useful location for the mass balance strips of lead.

Ample flap area is provided on the Balliol, the flaps themselves being of conventional split type and incorporated chiefly on the inner wing panels, although the trailing edge of the outer wings are given over to flaps between the fold point and the inboard ends of the ailerons. Flap structure is simple in the extreme, the skin being carried on top hat-section wedge ribs from a single spar of similar, although larger, section. Only the major inboard flaps are directly actuated, the small flaps on the outer wings being moved by the inner wing flaps through the medium of a spigot and socket connection.



All engine cowling panels have quick-release fasteners and certain panels are hinged to make complete removal unnecessary.



Either wing tank is easily removed by folding the wing, detaching the rib diaphragm, disconnecting the pipes, and withdrawing the tank.

Before leaving this part of the aircraft, a few words should be said on the control systems. For the ailerons, a system of push-pull rods and torque tubes transmit control motion out to the wing fold station, where a swinging link is inserted so that the wings may be folded without effect on the aileron control transmission other than slightly to "raise" the surfaces. However, at the aileron itself, the means taken to effect change of direction in control motion is astonishingly elaborate and, considering that the control loads cannot be very great, would seem to be exceedingly robust. The flap actuating gear is quite simple; a single pneumatic jack housed beneath the cockpit floor, between the spar bridge members, has its piston rod pivoted to a lever arm off a vertical torque tube, from a second arm off which a push-pull rod extends span-wise out to the wing root to pick-up a simple bell crank connected by a short link direct to the port inner flap. This system is duplicated on the starboard side, the vertical torque tubes being spanned by a cross-tube through which the operative motion is carried. Transmission linkage for elevator and rudder controls is by means of push-pull tubes throughout, the run from cockpit back to the control surfaces being split into several short lengths joined one to the other by swinging links. One of the major points of advantage in the Balliol's system of primary controls is that static friction in the system is virtually negligible. A point of comment by all pilots who used them.

Wing folding on the aircraft is simply a matter of unbuttoning a small door in the under-surface and pulling out a telescopic handle which, at the root, is connected to a simple linkage of struts and bell cranks to actuate the latch pins at the joints between the inner and outer plane lower booms of the spars. Both at the fold station and the wing/fuselage attachment, the joints are made with the connecting pins located horizontally in the top booms and vertically in the bottom booms. When the outer wing panels are folded, removal of the inter-spar outboard end rib in the inner wing permits the fuel tanks to be withdrawn; a very simple matter. Likewise, with the wing folded, direct access is provided to the Browning gun. Access to the G45 cine-camera, mounted in the starboard wing leading edge, is readily given by the removal of access panels in the upper and lower surfaces.

To sum up, one can assess the Balliol as being a clever design for its intended job. It is exceedingly robust and should prove popular both with aircrew and ground personnel alike.

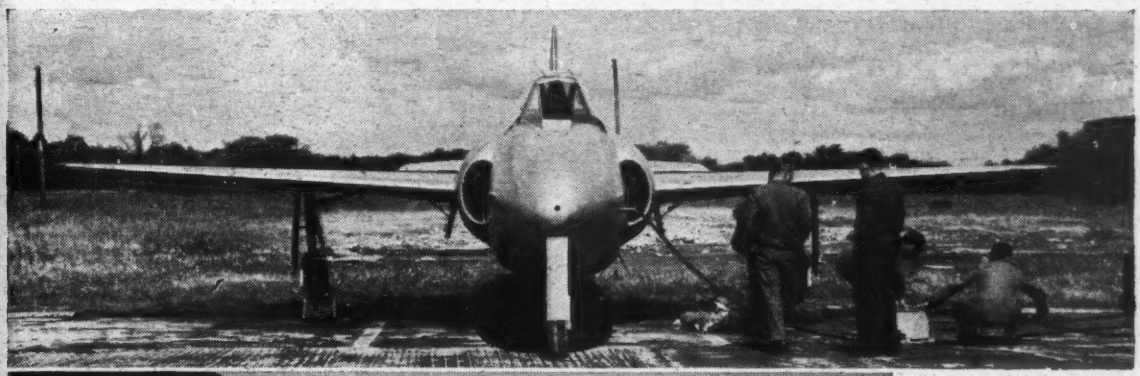
BOULTON PAUL BALLIOL T. Mk. I

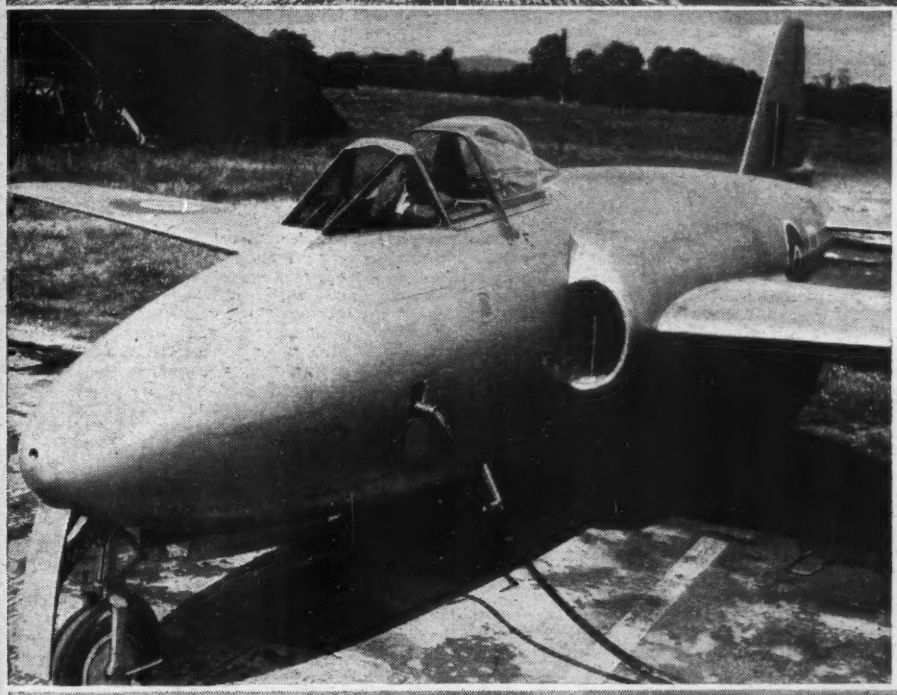
Armstrong Siddeley Mamba Airscrew Turbine Driving a D.H. Three-Blade c.s. Airscrew of 10ft Diameter

Aspect ratio	6.2
Standard mean chord	6ft 4.27in
T/C ratio (mean)	18.5 per cent
Gross weight	7,845lb
Percentage structure weight	36.4
Maximum speed	307 m.p.h. T.A.S. at 20,000ft
Maximum continuous cruise	272 m.p.h. T.A.S. at 20,000ft
Climbing speed	140 m.p.h. at sea level
Service ceiling	36,750ft
Take-off power	1,000 s.h.p. + 320lb. exhaust thrust
Maximum continuous cruise power	750 s.h.p. + 265 lb exhaust thrust
Take-off consumption	98 gall/hr
Maximum cruising consumption	79 gall/hr

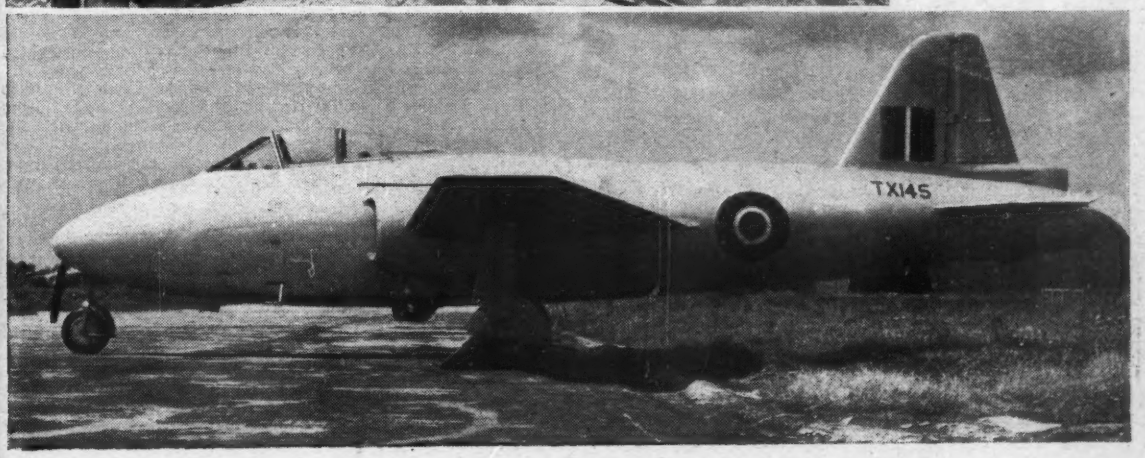
GLOSTER EI/44

New Views of a British Nene-Powered Fighter Prototype





SINCE the Gloster EI/44 single-jet fighter (Rolls-Royce Nene) was described in "Flight" of April 22nd this year, these new studies have been secured at Moreton Valence. They show such features as the wide-track undercarriage, neat cockpit enclosure and tail parachute (for experimental flying). Performance figures are not yet available but the "E!" should be capable of over 600 m.p.h. It is to be displayed at Farnborough in September. Other Gloster types scheduled to appear are the latest variant of the Meteor fighter and the Meteor 7 high-speed trainer.



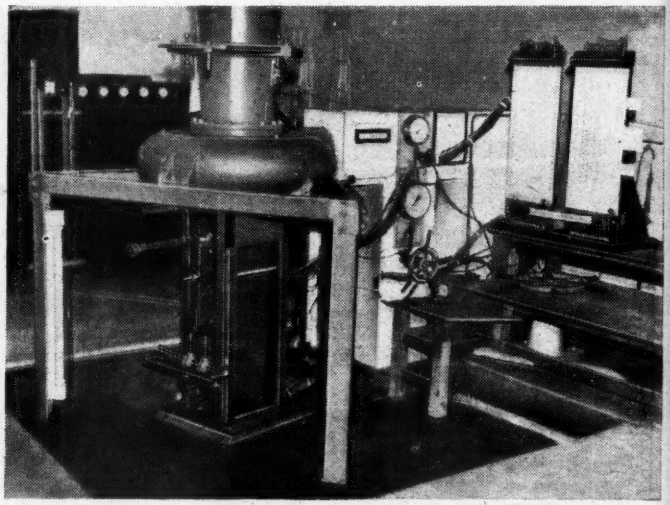
Research Revelation

Exhibition of Current Activities at the National Physical Laboratory

SINCE its foundation in 1900, the part played by the National Physical Laboratory in furthering the fundamental and applied research upon which so much of our modern industry devolves has by no means received the public recognition that it justly deserves. It is almost impossible to assess the advantages which have accrued to our industrial life in having the resources of such an establishment as the N.P.L. on call: certainly, it can be stated without fear of controversy that, had we not possessed some such centre as that at Teddington, we could not have sustained the eminent position of our manifold industrial activities in the way in which they have been sustained.

Originally devoted to investigations in the fields of physics, electricity, engineering, metallurgy and ship design, the ambit of N.P.L. was later widened to include mathematics, metrology, aerodynamics and radio. In addition to the routine testing of instruments and materials and the investigation of specific industrial problems, the laboratory also carries out a programme of research on a number of broader questions which affect the well-being of the community as a whole, or which are of interest to industry in general.

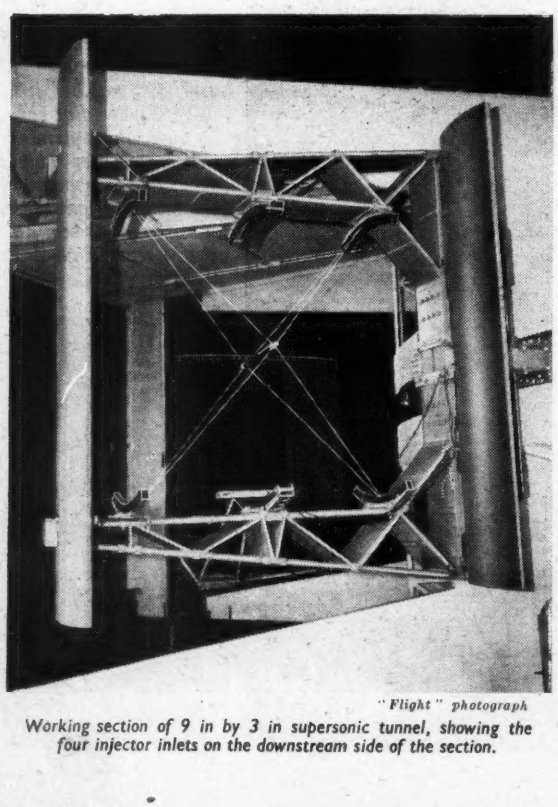
On Monday, June 21st, the N.P.L. was opened to representatives of industrial organizations and, on the following day, after inspection by the General Board, was visited by members of University staffs and Government departments. The organization of the "at home" was very well done, the various sections being given key numbers and the individual exhibits in those sections also given numbers. Thus, in laying out a programme, it was simplicity itself to select the items most relevant to one's own interests and, with the aid of a simple map included in the list of exhibits, to plot and follow an itinerary.



"Flight" photograph.

High-speed vertical tunnel showing new 9½ in square working section beneath injector shroud.

Naturally enough, the laboratory activities which were of greatest interest to us were those which had aeronautical point. There are many wind tunnels at the laboratory, some of them quite old, low-speed types which are, nevertheless, still doing valuable work and which have the unimpassioned beauty that seems to characterize laboratory equipment whether it be a steelyard, a microscope or a wind tunnel. The N.P.L. was also a pioneer in the construction of high-speed wind tunnels and, until very recently, possessed the only tunnels in this country, apart from the large tunnel at Farnborough, capable of fundamental research on a reasonable scale. In the quest for knowledge of aerofoil performance at high lift coefficients combined with high Mach numbers, measurements have recently been made on a number of aerofoil section shapes in the 20in by 8in rectangular high-speed tunnel, and valuable information has been obtained on the effect of various systematic changes of shape at the point of breakdown of lift at various Mach numbers.



"Flight" photograph

Working section of 9 in by 3 in supersonic tunnel, showing the four injector inlets on the downstream side of the section.

High-Speed Projects

One of the vertical high-speed tunnels has had the original 12in diameter circular working section replaced by a 9½in square section, and research is in progress to secure a uniform flow at a Mach number of 1.4; in addition to this, a 9in by 3in tunnel now being finished will have a subsonic speed range up to M 0.9 and a supersonic range from M 1.1 up to about M 1.8. Although this tunnel has been constructed partly for direct research, it also serves as a scale model for the development of two projected tunnels which will have working sections of 3ft by 1ft and which will be built during the next three years. These tunnels, in common with the 9½in square tunnel, and the 9in by 3in tunnel, will be of injector type and will permit Reynolds Numbers of the order of four million to be obtained, using models of about 12in chord.

A further projected tunnel with an 18in by 14in working section is now being built at Portsmouth Dockyard and is expected to be completed in about a year's time. This tunnel will also be of injector type, but will feature a pressurizing system to afford a stagnation pressure of three atmospheres, so giving Reynolds Numbers of the order of seven million with models of about 6in chord. The injection system of tunnel operation embraces the use of huge compressed-air reservoirs, in which air is stored at a pressure of about twenty-five atmospheres and is piped to the downstream side of the working section of the tunnel and admitted through adjustable slots by means of which the stream speed may be varied.

Boundary layer control is a subject which has frequently

Research Revelation . . . . .

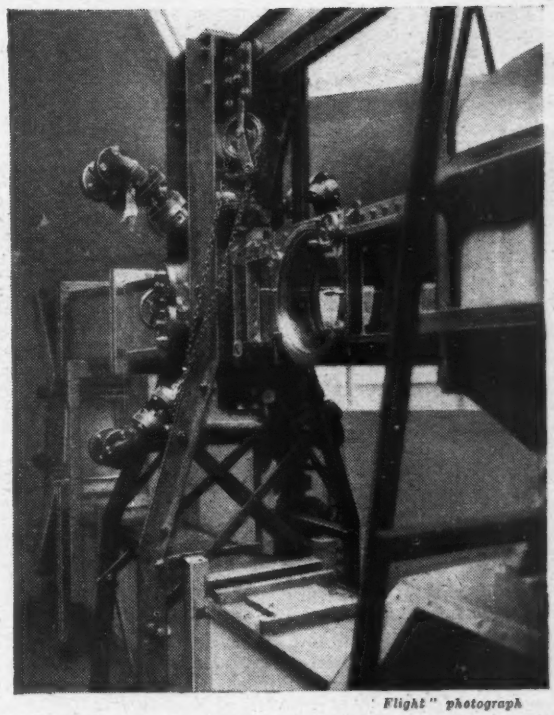
been featured in this journal, and we were particularly interested to see an investigation on these lines at Teddington. The section profile for the wings of a high-speed aircraft is made as thin as possible so that the critical Mach number may be as high as possible; for the same reason, the plan-form is usually swept-back. Unfortunately, thin sections usually stall at relatively low lift coefficients, and, to complicate the matter further, the choice of a swept-back plan-form leads to premature stalling of the wing in the tip region. The loss of overall $C_{L\,max}$ and the wing dropping associated with tip stall combine to make it very difficult to avoid an excessively high landing speed. A satisfactory cure for this difficulty would be a successful application of the principle of nose suction to the outer portions of the wings in order to delay the stagnation point of airflow and break-down into turbulence.

High-speed Bearings and Storm Plotting

As a first step in the study of this principle as a means of increasing the stalling angle and, therefore, the maximum lift, two specially designed sections of 8½ per cent t/c ratio, fitted with a slot near the leading edge, have been tested in two dimensions at the N.P.L. The tests have confirmed that the lift slope can be maintained to higher incidences by suction at the slot, and that the maximum lift coefficient can be increased by an amount which increases with the degree of suction applied. An alternative to the slot is an area of porous material by means of which the amount of suction required to produce a given increment of $C_{L\,max}$ may be very considerably reduced. This alternative is being investigated, and so far the results are encouraging.

Other exhibits at the laboratory which we found particularly interesting were the test rigs for high-speed bearings and the system of locating storm centres by radar. The problems associated with ball and roller bearings which have to cope with large loads whilst rotating at high speeds were sharply emphasized by the advent of the gas turbine. To help the aircraft engine industry in development of bearings for use in gas turbines, the laboratory have developed test rigs in which bearings suitable for shafts up to 3in diameter and for shafts between 3 and 6in diameter can be investigated. The rigs are such that radial loads of 10,000 lb and thrust loads of 15,000 lb can be applied, whilst the bearings are rotated at speeds up to 15,000 r.p.m. for units in the 3 to 6in diameter range, and up to 30,000 r.p.m. for bearings of under 3in diameter.

The location of centres of atmospheric disturbance by radio direction-finding was first started by Mr. (now Sir Robert) Watson-Watt as long ago as 1926 and, as the old concept of RDF grew into the modern prodigy of radar, so has this system of locating storm centres also been absorbed into the radar field. Since 1940, routine observations have been made regularly by the Meteorological Office. From the headquarters



"Flight" photograph

The whirling arm can carry a model through the air at speeds up to 100 ft/sec and manometric and camera records of its behaviour can be taken.

forecasting centre at Dunstable, land-line communication is maintained with three out-stations, respectively at Camborne, Cornwall; Irvinestown, Co. Fermanagh, Northern Ireland; and Luchars, Fifeshire. From 7 a.m. to 10 p.m. watch is kept by the meteorological service and information on storm centres is sent out in international code all over the world. At Dunstable and at each of the out-stations, the operator sits at his radar set and, when a lightning flash is recorded on the cathode oscilloscope screens, its bearing, relative to each of the observation stations, is taken. These bearings are then plotted and a fix of the centre of disturbance is obtained. The effective radius of action of the system is of the order of 1,500 miles, and the equipment used in this service has been designed and constructed in the radio division of the National Physical Laboratory.

GLIDING AT CARDIFF

THE practical aspect of founding a gliding club was the theme of deliberations at the inaugural meeting of the South Wales Gliding and Soaring Club at Cardiff airport on Tuesday, June 22nd. To an unexpectedly large attendance of over 100 potential gliders Mr. Kenneth Davies, the chairman, introduced Mr. T. Rex Young, chairman of the well-established Bristol Gliding Club, and Mr. Basil Meads, secretary of the Kemsley Flying Trust.

Mr. Young explained in detail how the Bristol club began and gave members some idea of the cost based on his own experience. Bristol members paid a subscription of two guineas yearly (four guineas for the experts taking up more expensive craft) and a launching fee of 2s 6d.

An informative talk on the types of craft required, their prices, availability and ways and means of raising capital was given by Mr. Basil Meads. The administrators of the Kemsley Trust were the friends of all interested in private flying in this country, he said, and in all cases of genuine enthusiasm the Trust would advance enough capital for the necessary equipment to be bought and it could be repaid over a period of years from local subscriptions and donations.

Gliders available "off the shelf," which he suggested, included the Elliot Eon Primary Trainer, the Baby Eon and the Olympia Eon. The latter was probably the best in the world, he added, and was a reproduction of the German Olympia designed for the 1936 Olympiad. The wing-span was 57 feet and the plane was well established as a record breaker. Three Sligsby craft were also suggested—the Cadet, Tutor and the two-seater T21, but unfortunately the latter was not immediately available.

Following the addresses, a demonstration of gliding was given by P/O. R. V. Gardner, A.T.C. instructor at St. Athan R.A.F. airfield, near Cardiff, who used a Kirby Cadet.

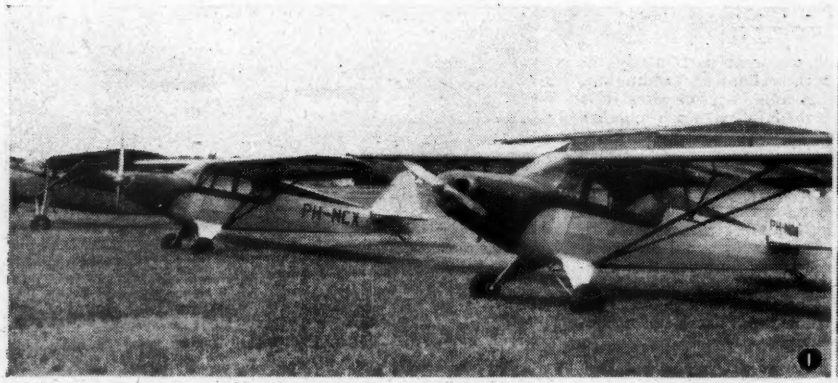
As a gesture of goodwill the Cardiff Aero Club concluded the meeting with a first-class aerobatic display.

S.B.A.C. OFFICERS

SIR ROY H. DOBSON, C.B.E., F.R.Ae.S., has been elected President of the Society of British Aircraft Constructors for 1948-49. Mr. W. T. Gill, C.A., has been elected Vice-President, and Mr. W. R. Verdon Smith, M.A., B.C.L, President of the Society from 1946-1948, becomes Deputy President.

Mr. Gill is a director of Rolls-Royce, Ltd. He was appointed chief accountant at the Derby factory in 1942, commercial manager in 1945, and became a director in March, 1946.

The following have been elected to the Management Committee of the S.B.A.C.: Mr. Robert Blackburn, O.B.E.; Mr. H. Burroughes; Mr. B. W. A. Dickson; Mr. H. P. Folland, M.B.E.; Sir Arthur Gouge; Major Sir Hew R. Kilner, M.C.; Mr. J. D. North; Sir Frederick Handley Page, C.B.E.; Mr. J. J. Parkes; Mr. F. E. N. St. Barbe; Sir Frank Spencer Spriggs, K.B.E.; Mr. C. C. Vinson; Mr. Walter Hackett, Jnr (Group A Associate Members, S.B.A.C.); Mr. E. J. Earnshaw (Group B Associate Members, S.B.A.C.).



Sporting Assembly

Visiting Aircraft from Seven European Countries Seen at Gatwick for the International Air Rally

FIRST to arrive at Gatwick for the Royal Aero Club's International Air Rally was Mr. G. Lithander, who, at 1500 hrs on the Friday afternoon, landed from Sweden in his specially equipped Saab Safir. The same evening Mr. Fraenkel arrived with a similar machine, both having extra tankage and special blind-flying panels. The next morning, at 1027 hours, the Duke of Almodovar del Rio, in his Airspeed Consul, landed with a large party from Spain, and by 1400 hrs a grand assortment of privately owned aircraft had arrived. In a class rather on their own as 3-4-seaters, the Renault-engined French Nord Norécrins were particularly interesting and the characteristic dihedral and forward-placed retractable nose-wheel made them prominent in the aircraft park. Mr. C. de Fels in his Magister with French markings was flying one of the few aircraft with open cockpits, and after he had taxied in Mr. Guy Feycheyr arrived in his Bücker Bestmann, the German-designed 2-seater, which, incidentally, is a standard trainer in the Swedish Air Force. At 1124 hours Mr. Jean Carle landed the Praga 114, an interesting lightweight giving a magnificent all-round view for the pilot but having rather limited room in the cabin. Another large party arrived from Belgium with Mr. G. Hanet in a smart Lockheed 12a. After several Piper Supercruisers and some more Norécrins had touched down, Mr. van Heek flew in from Holland in the first Ercoupe—that unique little two-movement-wheel controlled aircraft.

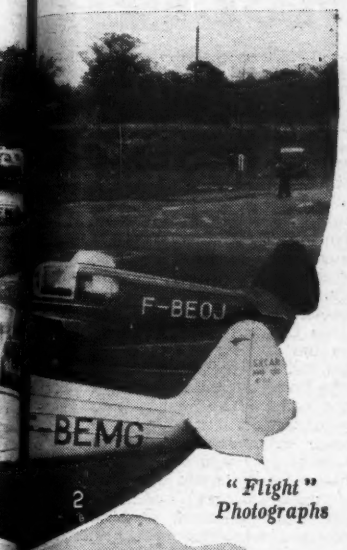
Obviously one of the oldest private aircraft at Gatwick that day was the Koolhoven F.K.43, brought from Holland by Mr. Wesselius. Later in the evening Mr. Flodin arrived in a Klemm Kl 35/D, and last of all, at 1828 hours, came Mr. Pinal in the Auster V from Spain.

This visitors line-up provided our manufacturers with a valuable opportunity to see the types of aircraft and standards of equipment and comfort favoured by private owners on the Continent.

1. *Two of the three Piper Supercruisers were flown from Holland. Mr. van der Drift arrived in PH-NCX and Mr. Uges Jr. in PH-NDA.*

2. *Norécrin F-BEMG, flown by Mr. Delansorne, and another —F-BEOJ—by Mr. Blumenthal, arrived together. Mr. Gillon's Navion in the background is being wheeled to the aircraft park.*

8. *The old Koolhoven flown in by Mr. Wesselius.*



"Flight" Photographs

3. *Mr. L. M. Jakobsen and Mr. Carl Hansen disembarking from the K.Z. III Lark, while Mr. C. de Fels taxies up in a Miles Hawk Trainer III, better known as a Magister.*

4. *A Bücker Bestmann flown by Mr. Guy Feycheyr arrived at 1115 hours.*

5. *One of the two specially equipped Saab Safirs.*

6. *Taxying along the perimeter track at Gatwick is the Airspeed Consul from Spain.*

7. *Shown here with the canopy hinged back and side windows dropped is the Praga, flown by Mr. Jean Carle. Shock absorbing for the undercarriage is through springs in each hub.*

9. *The Ercoupes, with their unique two-control system, aroused unusual interest. PH-HJP was flown by Mr. H. J. P. van Heek.*

I.C.A.O. SECOND ASSEMBLY

DURING the three weeks ending June 21st the governing body of the International Civil Aviation Organization reviewed the entire field of international air transportation, and approved the report of the I.C.A.O. Council on the work during the past year. The Assembly accepted the application for membership of Austria, which will become a member state on July 9th, and also that of Finland, which will become a member after its application has been approved by the General Assembly of the United Nations. The Assembly directed the Council to establish an air navigation commission with 12 members drawn from among the nominees of the 21 nation members of the Council. The Council is also required to appoint an air transport committee concerned with the economic side of international aviation. The Assembly considered problems involved in levying charges for the use of air navigational facilities and services supplied by various governments, particularly as it was felt that the present differences in methods created difficulties. The Assembly directed that the Council should study all phases of airport and air navigation services, and formulate recommendations for the guidance of members with regard to principles on which the providers of services may derive revenue. It was agreed by nine members engaged in Atlantic operations, to pay Iceland £150,000 a year for the upkeep of air navigational facilities there.

The Assembly called upon I.C.A.O. member states to extend the freedom of movement of aircraft of other member states, when engaged in private flights for pleasure, flights on business on the part of the company or individuals using the aircraft, and transit flights of non-scheduled services where no traffic was carried. Objectives of the I.C.A.O. programme for the facilitation of air transport across national borders to minimize the time taken for both passengers and freight was strongly endorsed. The Council was called upon to consider, with the I.C.A.O. legal committee, the need for developing an international legal convention on all phases of international air transport risks. On the basis of replies from states the Council will decide what measures can be taken to supply equipment necessary for flight safety and for complying with I.C.A.O. international standards of air navigational facilities, where member states do not themselves propose to supply it. Unanimous approval was given to a legal convention on the international recognition of rights in aircraft. This was thought to be of considerable importance since among other things the convention ensures the recognition by all contracting states of rights in aircraft constituted in any country party to the convention, is designed to afford international airline operators the largest possible measure of assistance in arranging the financing of aircraft purchases. It provides the best security for purchasers whether the assets are within or outside the state of registry of the aircraft. Attention was paid to the procedures employed by the Organization in the development of international standards and recommended practices which, when adopted, become annexes to the Convention. Until now the Council has approved five of the annexes.

Specific proposals were made for the improvement of the Organization of the air navigation committee and its eleven Divisions, and a request was made that representatives should not be given such rigid instructions as to prevent agreement being reached, and recommendations being made in the general interest of aviation. The Assembly was concerned with the wording of three articles of the Convention of International Civil Aviation, Articles 33, 39 and 41. Article 33 deals with the certificates of airworthiness and certificates of competency of airmen issued in one contracting state of I.C.A.O., being recognized in all other member states. The Council has been requested to study clarification of that Article. The Assembly directed the Council to prepare an amendment to simplify procedures concerning failure to comply with all the requirements of an international standard as laid down in Article 39. Article 41, the implications of which were explained in *Flight*, June 10th, and which regulates the application of standards of airworthiness in aircraft, was discussed, but it was considered that it should remain until 1950, when the entire Convention will be reviewed by the Assembly.

Difficulties have arisen in the application of a resolution of the First Assembly in 1947 on disciplinary measures which should be taken by states against airmen licensed by them but who have broken laws and regulations in another state, whilst in flight. The present Assembly has decided to reverse the decision, and to request the authorities to enforce its regulations against all who infringe them, irrespective of nationality. One of the main features of the Assembly's work were discussions which were designed to produce closer administrative relationship between I.C.A.O. and the United Nations.

The sum of $1,399,882 (Canadian) was voted for the six-month period from July 1st to December 31st, 1948, and for the twelve-month period from January 1st to December 31st, 1949, a budget figure of $2,649,685 was voted. The budget is substantially unchanged over the 1947-48 period, but owing to the entry of new members into the Organization the payments of most member states have been slightly reduced.

AMBASSADOR PERFORMANCE SUMMARY

EQUIPPED with Bristol Centaurus 661 series engines using 100/130 grade fuel allowing take-off power to be maintained to 5,500 feet, the Ambassador, when furnished to carry 40 passengers, weighs 35,548 lb, made up as follows: crew and baggage 760 lb; flight equipment 15 lb; and fixed catering supplies 88 lb. The payload or range characteristics depend largely on the length of runways available for take-off and landing. The following figures are those for a range in statute miles of maximum weight corresponding to various runway lengths.

I.C.A.O. runway length required	yd	1,300	1,500	1,700
Maximum take-off weight of aircraft	lb	47,000	50,000	52,000
Maximum landing weight of aircraft	lb	46,300	50,000	50,000
Disposable load	lb	11,452	14,452	16,452
Block distance for maximum payload (11,135 lb)	st. m.	—	219	667
Payload for block distance of:				
460 statute miles	lb	7,338	10,113	11,135
920 " "	lb	5,627	8,253	10,136
1,150 " "	lb	4,771	7,368	9,195
Block distance with full tanks (1,000 Imperial gallons)	st. m.	1,440	1,370	1,335
Payload with full tanks	lb	3,716	6,557	8,458
Rate of climb after failure of one engine during take-off. Flaps 15° auto feathering:				
Undercarriage down	ft/min	325	250	200
Undercarriage up	ft/min	490	415	365

When computing payloads, magazines (40 lb) and crew's food and drink (48 lb), and a food and drink allowance of 12 lb per passeger, have been deducted from the disposable load. The I.C.A.O. runway length quoted is for the completion of take-off or stop after failure ot one engine at critical point, and for landing within 60 per cent of the runway length. Details of the fuel carried in computing the block distances took into consideration the take-off, climb in weak mixture to 20,000 ft, cruise at 42 per cent M.E.T.O. at 20,000 ft, descent at 700 ft per minute, which is equivalent to 300 ft per minute at sea-level in the cabin, a stand-off for 45 minutes at cruising threshold speed, and a diversion of 230 statute miles at 42 per cent M.E.T.O. power. In the calculations also were included allowances for a head wind of 12 m.p.h., errors of navigation amounting to 2 per cent, and engine maladjustment 3 per cent. The ultimate ranges with no allowances corresponding to the block distances given as follows: 460 statute miles = 990 statute miles, 920 statute miles = 1,495 statute miles, 1,150 statute miles = 1,750 statute miles, and 1,370 statute miles = 2,010 statute miles.

BRITISH AIRWAYS STATISTICS

OPERATING and traffic statistics of the three Corporations for the financial year 1947-48 show nearly 50 per cent increase over the preceding year The number of passengers carried rose from 419,000 in 1946-7 to 628,000 in 1947-8, and the weight of freight carried from 3,918 tons to 5,783. The Corporations also carried 3,270 tons of mail in 1947-8 against 2,620 tons in 1946-7.

The amount of traffic carried by the individual Corporations in the year just ended can be seen from the following figures:

	Passenger-Miles	Freight Ton-Miles	Mail Ton-Miles
B.O.A.C.	296,054,000	7,291,000	7,215,000
B.E.A.	122,475,000	1,559,000	573,000
B.S.A.A.	51,512,000	2,975,000	948,000
The corresponding figures for the year 1946-7 were:			
B.O.A.C.	275,569,000	5,631,000	5,996,000
B.E.A.	30,035,000	477,000	307,000
B.S.A.A.	31,496,000	1,115,000	783,000

Too much weight should not be given to a comparison of the individual Corporations' figures for the two financial years, as their spheres of operation varied over the period. For instance, B.O.A.C. European services were transferred to B.E.A. in August, 1946, and B.E.A. did not complete the absorption of the independent internal operators until April, 1947.

HELICOPTER RECORDS

Fairey Gyrodyne Flies at 124 m.p.h.

ON Monday, June 28th, S/L. Basil Arkell flew the Fairey Gyrodyne along the northern boundary of White Waltham airfield over a three-kilometre course twice eastward and twice westward. The average speed of the best two of his runs was 124.3 m.p.h., and at that figure, subject of course to official homologation, have been established both the first British National record for helicopters, and the International (Class G) record. A most praiseworthy effort. Although the International record for helicopters was held for some long time by Germany with an F.W. 61 at a speed of 122.533 k.p.h. (76.7 m.p.h.), up till now there has been no British national record simply because there has been no British helicopter to have established it. It is worth noting also that a speed of 114.6 m.p.h. by a Sikorsky R-5 was unofficially observed in the U.S.A. last year.

The decision to make a record attempt was made relatively late, and the weather conditions delayed the attempt for some hours. Finally, however, the rain and robustiousness of the wind abated somewhat and Arkell took off. For convenience, the 3-km. course length was marked out along the railway and the Gyrodyne flew along about 25-30ft above the embankment. This course was, unfortunately, 45 deg out of wind.

One thing that has been established beyond doubt by this achievement is that the Gyrodyne is capable of a speed perhaps 20 m.p.h. in excess of the record figure. Prior to the record attempt, the Gyrodyne flew cross-country from Heston to White Waltham with Mr. Massey Hilton, a director of Fairey's, as passenger.

A new air photograph of S/L. Arkell flying the Fairey Gyrodyne. It shows to advantage the layout of the helicopter.

The unique feature of the Gyrodyne, and that which is chiefly responsible for its speed performance, is that, contrary to the normal practice of employing a transverse airscrew to balance torque reaction of the main rotor, a conventional tractor airscrew is mounted at the extremity of a stub "wing" to achieve the same effect. In addition to this, however, the airscrew thrust contributes a considerable proportion of the work of driving the aircraft forward and this, in turn, permits the main rotor blades always to operate within the auto-rotative pitch range.

METEORIC BALKAN TOUR

DURING the recently concluded tour of the Meteor 8 Trainer, in Turkey, Greece and Italy, great public interest was aroused wherever the aircraft went and, in fact, it was the first jet-propelled type ever seen in Turkey and Greece.

S/L. Bill Waterton flew the Meteor from Tangmere to Ankara, 2,135 miles, at an average ground speed of 451 m.p.h. The first leg, Tangmere to Marseilles, of 580 miles, was flown in 75 minutes at over 30,000 ft, and in spite of the high cruising speed, the Meteor still had sufficient fuel for a further 372 miles. At Ankara, during the three-day stay, the Meteor's displays were attended by the Prime Minister and members of his Cabinet, Army and Air Force generals, Members of Parliament and Air Force personnel. General Muzaffer Göksenin, Under-Secretary for Air, General Fevzi Uçaner, Chief of Staff for Air, were given flights, as well as members of the Air Force and regimental commands, and all expressed themselves tremendously impressed with the Meteor's performance. Similar demonstrations were given during the Turkish visit at Eskisehir, Izmir and at Istanbul, where the President of the Turkish Republic, H.E. Ismet Inönü, attended as guest of the British Ambassador.

Gen. Fevzi Uçaner, Air Adviser to the Turkish general staff, after his flight. Bill Waterton is on the left.

On the return trip, the Meteor was demonstrated at Athens, in the presence of the King and Queen of Greece, ex-King Michael of Rumania, Air Ministry officials and senior members of the Greek Air Force. In the evening, a public demonstration over the city created considerable excitement. Demonstrations were also given in Rome and Paris before the return to England, and during the whole tour the box of spares for the Derwent V engines was not once opened. At the end of the trip, after hundreds of starts, take-offs and lengthy periods of full-power running, each engine had logged the considerable total of 74½ hours.

DERBY DISPLAY

(*Continued from page 7*)

5g circuit of the airfield. Close examination of the Meteor revealed that the Derwents' air intakes were nearly twice the normal size, giving the impression that the aircraft's clipped span had been even further reduced.

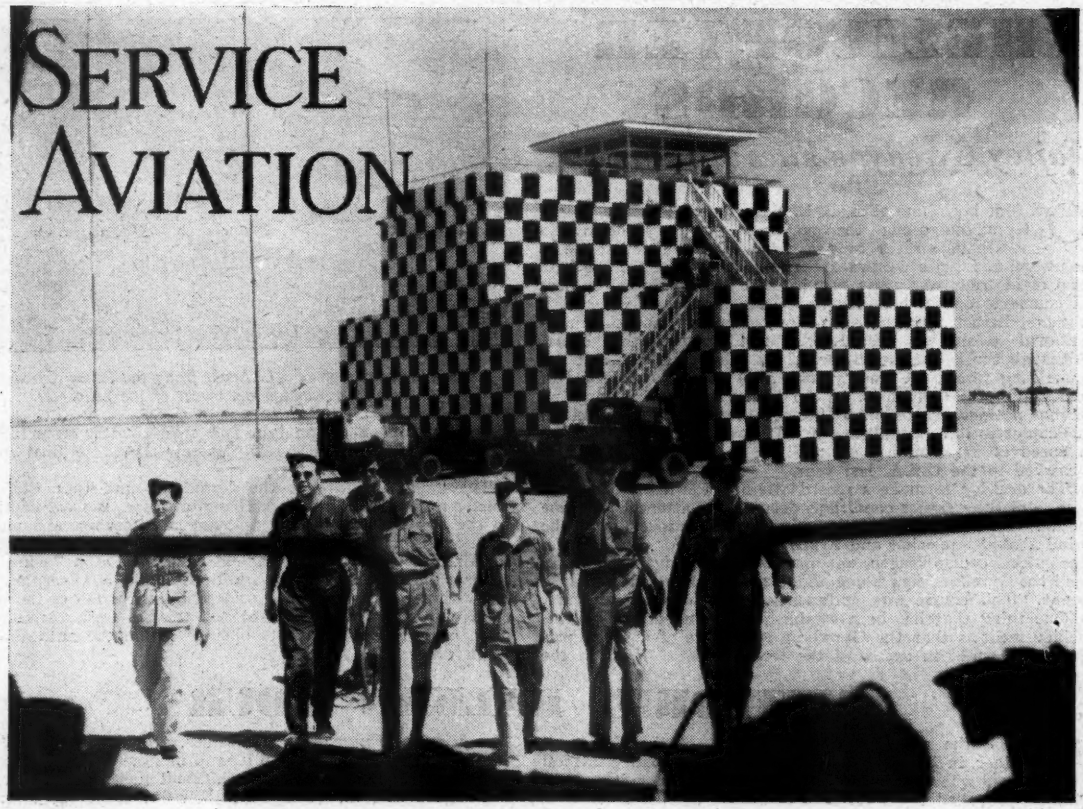
The Lancastrian's performance was a fine example of smooth and perfectly judged demonstration flying, and on the first high-speed shoot-up, with four engines running, many spectators appreciated what was subsequently confirmed, that this was one of the machine's fastest low-level transits to date. The Nene-Vampire treated W/C. McDowell somewhat shabbily in view of the fact that it was his birthday. He had planned to demonstrate its exceptional acceleration and climb away from a simulated baulked landing, but fuel starvation caused him to abandon the demonstration after one high-speed fly-past.

A. Cdre. Oliver next took the air in Goodyear's smart black Gemini, and his demonstration was noteworthy for a distinctly dicey low-speed, wheels-up fly-past, when, in spite of the strong wind, his airscrew tips were momentarily within six inches of the ground.

The final events of the afternoon included formation flying by Mosquitoes of 616 Auxiliary Squadron, some very smooth aerobatics from F/L. J. McConnell, of No. 617 Auxiliary Squadron, flying a Spitfire Mk 16, and two excellent demonstrations by S/L. Porteous flying first his wife's Miles M.18 and, second, a Messenger. The M.18, with its short, thick wing with square tips, was shown to be very manœuvrable and to have excellent low-speed characteristics. The Messenger's antics had almost to be seen to be believed. With the aid of strong wind, S/L. Porteous touched down on a medium turn on one wheel with wing-tip brushing the grass. He landed at 90 degrees across wind, purposely mislanded and hauled the machine up at an alarming angle until it was hanging on its airscrew at not more than 50ft, and each time recovered smoothly and rapidly to fly round again or touch down neatly at near walking pace on three points.

Tea and a tour of the Static Exhibition completed the programme

SERVICE AVIATION



SUDANESE ARCHITECTURE : The control tower at R.A.F. Station Khartoum with a crew coming from de-briefing after a flight from England.

Appointment

THE Air Ministry announces the appointment of Air Vice-Marshal Alfred Clifford Sanderson, C.B.E., D.F.C., as Air Officer Commanding Air Headquarters, Malaya.

Air Vice-Marshal Sanderson has been Air Officer in Charge of Administration, Air Command, Far East, since April, 1947, and was formerly Air Officer Commanding, Air Headquarters, Burma, from November, 1946. During the war he held appointments as a Station and Wing commander in the Middle East and a Senior Air Staff Officer at R.A.F. Headquarters, Palestine and Transjordan, R.A.F. Headquarters, Mediterranean, and Air Headquarters, Egypt, until in May, 1943, he became Director of Administrative Plans at the Air Ministry, a post he held for nearly three years.

Vampire Makes a Splash

THE D.H. Vampire III jet fighter, now undergoing tropical trials in Singapore, has recently completed a tour of the more important towns of Malaya, giving demonstrations before about 25,000 spectators. Towns visited included Kuala Lumpur, Ipoh, Taiping, Butterworth, Alor Star and Georgetown. At Taiping—a tin-mining centre—the Vampire landed on grass after a rainstorm. On touching down it was almost obscured from view as a wave of water and dried grass swept over it. An onlooker remarked that after coming to a standstill, it looked as though it had flown through a haystack. At Ipoh, also, there was a heavy rainstorm on the day of the demonstration. After a downpour lasting an hour and a half the Vampire took off, raising clouds of spray and steam.

At the end of the tour the machine flew from Butterworth to Tengah (Singapore), 385 miles away, in 47 minutes, at an average speed of 493 m.p.h.

Royal Air Force and Naval Aviation News and Announcements

Surrey A.T.C. Inspection

ON the afternoon of June 19th the Air Officer Commanding-in-Chief, Reserve Command (Air Marshal Sir Alan Lees) with the Air Officer Commanding No. 61 Reserve Group (A. Cdre. Sir H. Broadhurst) inspected some 300 A.T.C. cadets in Gostrey Meadow, Farnham. These cadets, under the command of S/L. A. Longhurst, R.A.F.V.R., formed No. 13 Area, A.T.C. The inspection also included cadets from the Farnham A.T.C. Squadron and there were 30 officers on parade.

Before attending the inspection Sir Alan Lees and Sir H. Broadhurst opened the new headquarters of the Farnham A.T.C. Squadron in Farnham Park. The C.-in-C. and the A.O.C. were received by the chairman of the town council and the chairman of the squadron. The Commander-in-Chief also inspected the Farnham A.T.C. Squadron under the command of F/L. A. G. Dobbs, R.A.F.V.R.

A.T.C. Age Limit

BOYS may now join the Air Training Corps at the age of 14 instead of 15. They will still have to do three months as probationers. Grants made to the units will be paid from the lower age limit. The Corps is about 50,000 strong with nearly 800 units, which are all open to recruiting.

Scottish Observers Exercise

THE first large-scale exercise of the Royal Observer Corps in Scotland since it was re-formed last year took place on June 20th, when five of the eight Scottish groups were in action, tracking and plotting aircraft over the length and breadth of the country. Arranged jointly by Scottish Area, Royal Observer Corps and H.Q. No. 66 (Scottish Reserve) Group, R.A.F., the exercise was planned to test R.O.C. members in identification, estimation of height, course and speed, and plotting the progress of a variety of aircraft types, ranging from Hornets to Tiger Moths. Fighter and trainer aircraft of Edinburgh, Glasgow and Aberdeen auxiliary squadrons and University Air Squadrons, together with those of 66 Group Comm. Flight, provided the "enemy," ranging over areas centred on Turnhouse, Abbotsinch and Dyce.

The Observer Corps groups in action were No. 31 (Edinburgh and Borders), 33 (Ayrshire), 34 (Glasgow and Lanarkshire), 37 (Dundee) and 38 (Aberdeenshire). Operation rooms were manned at Edinburgh, Dundee and Aberdeen, while more

Service Aviation . . . . .

than 600 observers were on duty at 111 "spotter" posts, ranging from St. Boswell's and Kirkcudbright north to Huntly and Macduff. The posts themselves varied from seashore to mountain top. Leading Observer Meikle kept watch on aircraft nearing Turnhouse from the top of the huge pit-head at Winchburgh, West Lothian, after he and his assistants had been hauled up to their post in one of the trolleys used for dumping shale. They were smothered in dust before their four-hour shift was completed.

The exercise went off extremely smoothly, but officers of the Corps were careful to emphasize that many more recruits for all branches of the service are required before the R.O.C. could resume the operational role it fulfilled in the war years. Present strength of the Corps in Scotland is about 1,600, compared with a wartime strength of 7,000. The Scottish Area Commandant (Obs. Capt. J. M. Miller) visited the Aberdeen Operations Room during the exercise and his Deputy (Obs. Commander Q. Dunlop) went to Dundee. It is hoped to hold an exercise in August for the other three groups of Scottish Area—Oban, Inverness and Dunfermline—and full-scale exercises are planned for next year.

Light A.A. Appointment

MANAGER of Dyce Airport, Aberdeen, for the Ministry of Civil Aviation, Mr. A. Carrie, has been appointed Officer Commanding No. 2612 Light A.A. Squadron of the Royal Auxiliary Air Force, and has the rank of squadron leader. Mr. Carrie was manager at Doncaster Airport before the war.

Permanent Commissions

THE following officers have been selected for permanent commissions in the R.A.F. in the branches indicated.

General Duties Branch

W/C. G. K. Buckingham, D.F.C.

S/L.s F. E. W. Birchfield, O.B.E.; R. C. Haine, D.F.C.

Technical Branch

S/L.s J. E. Barber, O.B.E.; G. G. Cole, M.B.E.; H. F. Davis; S. R. Newton, O.B.E.

F/L.s F. J. C. Cooper; A. B. Haskell, M.B.E.; W. C. Hewlett; H. H. King, B.E.M.; H. A. Oldfield; E. J. Partridge; E. G. Revell.

Equipment Branch

W/C. R. M. W. Henderson.

S/L.s R. S. Harries; H. R. Johns.

F/L. J. A. Todd.

Secretarial Branch

F/L. E. I. Williams.

Provost Branch

W/C. B. W. S. Smith.

S/L. J. R. Coulson; H. Mundy.

Short Service Commissions

THE following officers of the R.A.F. have been appointed to short service commissions in the branches shown:—

General Duties Branch

F/L.s M. H. Castle; G. S. Wilkes.

F/O.s J. S. S. Hay; G. A. Sherrat; F. M. Taylor.

Technical Branch

F/L.s F. J. A. Blagden; J. Crane; R. W. Huntley; J. W. St. John.

F/O. S. J. Webb.

Equipment Branch

F/L.s R. A. Albonico; L. B. Davey; J. Edge; R. A. Langton.

F/O.s E. D. Artus, I. H. Hodgkiss; T. Pilkington; D. E. Spencer.

Secretarial Branch

F/L.s D. MacDonald; J. MacD. Munro; R. H. Wybrants.

F/O.s J. M. Kenworthy; E. V. Stephenson.

Chaplains Branch

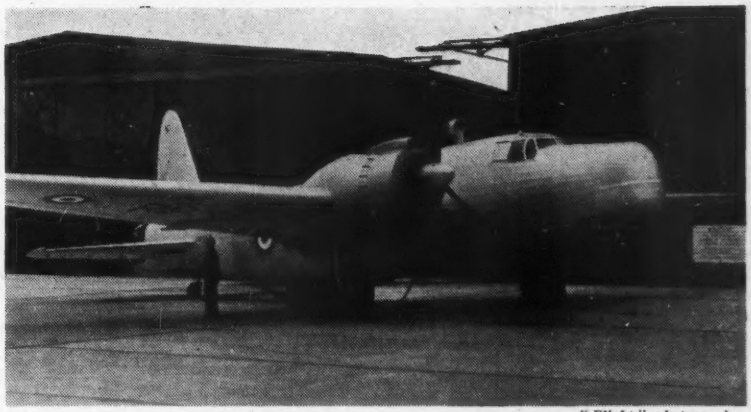
Rev. P. J. Hendron (Roman Catholic)

Catering Branch

F/O. W. R. Tamblyn.

Physical Fitness Branch

F/O.s F. Green; D. E. C. Keeling; R. D. Mullins.



"Flight" photograph.

WEARING WELL: At the Wolverhampton works of Boulton Paul Aircraft Ltd., Wellington Mk. 10s are being converted for crew-training. Having been thoroughly stripped and re-covered they are fitted with a nose fairing as shown. The tail turret is retained.

Observer Visit

MORE than three thousand members of the Royal Observer Corps had their first opportunity lately of seeing the R.A.F. jet fighters in action at close quarters. Fifteen hundred men and women observers were invited to Horsham St. Faith, near Norwich, a similar number to Linton-on-Ouse, near York, and 300 to Acklington, near Newcastle. The normal training of the R.O.C. involves duty at isolated observer posts or operational rooms, and the observers have few chances of seeing the fighters they help to direct to their targets. Station Commanders explained how the information supplied from the posts enables Fighter Command aircraft to reach their objective.

The observers were shown round the stations, inspected aircraft on the ground, watched flying displays, and participated in height-judging competitions. R.A.F. Transport Command aircraft gave them flights. The three stations are all in No. 12 Group, R.A.F. Fighter Command, and the Air Officer Commanding (Air Vice-Marshal T. C. Traill, who fostered the rallies) and the Commandant of the R.O.C. (Air Commodore the Earl of Bandon) were at Horsham St. Faith which, like Linton-on-Ouse, is a fighter sector headquarters.

BETWEEN SHOOTS: A Spitfire 16 of No. 604 Squadron, R. Aux. A.F. is refuelled, between air firing sorties, at Thorney Island, where the Squadron's first annual summer camp ended on June 12th. Left to right are Pilot II Hicks, F/O. Gillett, Pilot I Goodman and F/O. Hodgkinson. The C.O. is S/L. K. T. Lofts, D.F.C. Hours flown during camp were 126.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

OBSTACLES TO FLYING

The Question of Airfields

MAY I trespass on your valuable space to air a very large grouse? It is this: Why do the powers-that-be do their best to make air travel slower than that by car or rail? Every possible obstacle is put in the way, for example, of civilian aircraft landing near their destination.

I happen to live in the Salisbury district. In 1931 a flying club was started. It restarted after the war, only to be evicted from the field it used in 1931 in order that more of the taxpayers' money could be spent on developing Boscombe Down. The club was obliged to go to Thruxton, many miles away. Boscombe Down is closed to landings by civil aircraft, and so is Old Sarum, so that a person wishing say, to go to Salisbury Races, has the doubtful pleasure of travelling 17 miles by car.

I think one of the worst features of flying is the deplorable veiled hostility between R.A.F. and civil airfields. In the present crisis, fields suitable for flying are not easily obtainable because so much land is under the plough.

Surely more R.A.F. airfields could be made available for civilian landings. After all, it is the poor taxpayer who maintains the R.A.F. The point of flying is, in many cases, to save time; yet for travelling in this country it is literally often quicker to hire a car. W. J. ABERNETHY.

Salisbury, Wilts.

GREATER AIR SAFETY

Use of High Octane Kerosene

RECENT correspondence, culminating in the article "Towards Greater Air Safety" in your issue of May 20th, shows a welcome increase in the reduction of fatalities and injuries following aircraft accidents.

It is beyond argument that everything possible must be done to eliminate accidents, but, the human element being what it is, high-speed transport can only be run at the expense of inevitable but, one hopes, increasingly infrequent accidents. In the air little, if anything, can be done to increase the chances of survival of the occupants of an aircraft which flies into a hill in bad weather, or breaks up in the air, but the effects of a heavy landing resulting from an under- or overshoot, or an engine or control failure during take-off, can be lessened.

The advantages of rearward-facing seats have been stressed. These make an important contribution, but the over-riding consideration is to avoid, or at least delay, the onset of fire. The "crash-proof" tank helps, at the expense of pay-load and range, particularly where the latter is limited by the volumetric fuel stowage capacity of the aircraft. There remains the fuel.

The introduction of the diesel engine for aircraft use has many supporters, few of whom, however, can be aware of the immense problems involved, both in time and effort; and its development cannot seriously be supported, except for very advanced compound applications.

For ten or twelve years the major fuel companies have realized, and have stated publicly, that it is possible to produce a fuel for aircraft piston engines employing high-pressure cylinder injection, which, on all grounds of common sense, is safer than gasoline in the heavy-landing type of accident, and no more dangerous under any other conditions. This fuel may be regarded as a high octane kerosene and is commonly called "Safety" fuel. The full development to the scheduled airline route stage of injection engines, based on current conventionally carburetted designs, would probably take three years, though two years should suffice for the later models of the Wright R.3350 as fitted to the Constellations.

A 100/130 grade "Safety" fuel would cost more than a gasoline of a similar knock rating, and it is difficult to see now how such a fuel could be made economically in the still higher anti-knock ratings which will be needed before we see the end of the piston engine. However, time will undoubtedly solve this problem. There would be a weight penalty in that the calorific value per gallon would be less than that of gasoline, balanced by increased calorific value on a volume basis.

The problem is to balance greater safety against greater cost. It is a true "chicken and egg" problem. The fuel companies cannot estimate the cost until they know the demand. The engine builder will not put the effort into developing the engine unless he is assured of a market, and the airline operator will not order until he knows the probable price of the fuel and has concrete evidence of the greater safety factor. He will never really know the latter until many aircraft have been flown on the fuel and accidents have happened.

The adoption of "Safety" fuel would be an act of faith, which, from the nature of the problem, could not properly be supported by data, although experience with gas turbine-engined aircraft operated on aviation kerosene, which has flash point and volatility crash ignition characteristics similar to those of "Safety" fuel, provides some indication of what might be expected.

Some accidents to turbine-engined aircraft have resulted in fires and some have not, but there have been heavy landing crashes in which the area of the accident was soaked with fuel, but no fire occurred.

Fires may start with the ignition of the lubricating oil from contact with hot parts of the engine, or from other sources, and this fire may of course spread to areas saturated with fuel. With gasoline, the result is an instantaneous spread of fire throughout the whole area, the first bulk of the fire occurring in the vapour, whereas with the high flash point "Safety" fuel the initial stages of the fire, if it occurs, will be infinitely more gradual. With gasoline there is not time to do anything; with the high flash point fuel there will be minutes available in which to get the occupants out. If anyone doubts this, let him try soaking a bonfire with petrol in comparison with kerosene.

Whatever the future may bring in regard to the use of "Safety" fuel in piston-engined aircraft, it will be a tragedy of the first order if the commercial use of the gas turbine, whether in straight jet or propeller form, is allowed to proceed with anything other than high flash point fuels. This view has some support in this country, but there is a current tendency in the United States to increase the volatility and decrease the flash point of gas turbine fuel to a point where it is comparable with gasoline, primarily to extend availability of supplies in the event of war.

For the first time in the lives of many of us there is a chance to develop a new engine and a new fuel together, and reduction in crash fire risks by insistence on the use of high flash point low volatility fuels is the only sensible course to follow. KENNETH HUNT.

Hampstead, N.W.3.

FORTHCOMING EVENTS

July 3rd.—Air Service Training : Flying display and "Open Day," Hamble airfield, Hants.
July 3rd to 5th.—Private Air Rally for members and associate members of the Royal Aero Club at Deauville, France. (Guests of M. F. André).
July 3rd.—R.Ae.S. (Glasgow). Visit to Blackburn Aircraft Ltd., Dumbarton.
July 4th.—Leicester Aero Club : Air Day and Club "At Home," Ratcliffe airfield.
July 14th.—R.Ae.S. (Hatfield) : Film Evening.
July 17th.—Southend-on-Sea Air Rally.
July 17th.—Women's Junior Air Corps : Summer rally at Hendon airfield.
July 18th.—City and County of Newcastle-upon-Tyne : Air display at Newcastle airport, Woolsington.
July 19th to 31st.—Swiss International Gliding Competitions, Samaden.
July 24th to 26th.—Private Air Rally for members and associate members of the Royal Aero Club at La Baule-Escoublac, St. Nazaire. (Guests of M. F. André).
July 31st.—Aero Club of Orange Air Rally.
July 31st. to Aug. 8th.—International Model Aircraft Meeting, Eaton Bray, Beds.
Aug. 1st.—Boroden Cup for Model Aircraft with mechanical engines, London Region.
Aug. 7th.—Air Meeting and Competitions at Ypenburg, Holland.
Aug. 7th.—Midland Aero Club : "At Home," Elmdon airport.
Aug. 14th and 15th.—Butlin's Week-end Air Rally at Broom Hall, Pwllheli, N. Wales.
Aug. 22nd.—Cowes Aero Club : Annual air display, Cowes airport, Isle of Wight.
Aug. 26th.—R.Ae.S. (Glasgow) : Lecturettes, Grand Hotel, Glasgow.
Aug. 27th to Sept. 5th.—Aero Club de France. "Tour de France."
Aug. 28th and 29th.—Cinque Ports Flying Club : International flying meeting, Lympne airport.
Aug. 21st to 29th.—International Aviation Week : Grenchen airfield, Switzerland.